METEOROLOGICAL OFFICE
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MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COUNCIL,

1886—1887.

LONDON:
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1887.

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1886—1887.

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Office

MINUTES OF THE PROCEEDINGS

OF THE

METEOROLOGICAL COUNCIL.

1886—87.

116, *Victoria Street, April* 7, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
PROFESSOR STOKES.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (March 17) were read and confirmed.

Mr. Scott reported that he had ascertained from the Trinity House (Letter 789) that there was no building belonging to that Board on the coast of Durham available for the erection of an anemograph.

He further reported that he was in correspondence with the authorities at North Shields in reference to the site on Dockwray Square (Minutes, 1885, p. 42).

Read—The following letter:—

(M.O. 863).

DEAR MR. SCOTT, Kew Observatory, April 7, 1886.

AT the meeting of the Kew Committee on the 26th ult., great regret was expressed at the cessation of the records of the electrograph at this observatory, in accordance with the decision of Meteorological Council as communicated to me in your letter No. 1633 dated July 30th, 1885.

I was directed to inform you that the Committee would strongly recommend that registration should be recommenced, employing, instead of a Thomson electrometer, an instrument as arrranged by Mr. de la Rue, which is free from the defects of the Thomson.

In it the potential of the instrument is maintained at a constant point by keeping it in connection with the electrodes of a battery of 60 chloride of silver cells. The cost of the apparatus in its most improved and recent form is given by Messrs. Elliott Bros. in their estimate, a copy of which is enclosed, as 35*l.*

Will you therefore, have the kindness to direct the attention of the Meteorological Council to this matter, and oblige,

Yours, &c.
(Signed) G. M. WHIPPLE,
Secretary to the Kew Committee.

DEAR SIR, London, April 6, 1886.

IN answer to your inquiry of 1st inst., we beg to hand you the following quotation, viz.:—

	£	s.	d.	
Electrometer, Lecture pattern, with de la Rue's improvements -	12	12	0	
Gilding - - - - - - - - -	1	5	0	Extra.
Electrometer, Clifton's pattern, as described - - -	15	0	0	
Small cabinet containing 60 de la Rue's chloride of silver cells with improved stoppers - - - - - -	20	0	0	

Yours, &c.
(Signed) ELLIOTT BROTHERS.

G. M. Whipple, Esq.

Mr. Scott was instructed to ascertain what would be the cost of maintenance of the proposed observations.

E 21797. 25.—4/86. Wt. 312. E. & S. A

Mr. Scott submitted the following memorandum with reference to the extract from Professor Hann's paper (Minutes, 1885, p. 117) :—

OBSERVATIONS made by the ROYAL ENGINEERS at various Foreign Stations.

STATION.	Observations per day.	In Manuscript at Meteorological Office.	Published by Col. Sir H. James.	No. of Months Unpublished.
Newfoundland -	2	August 1852—March 1862 -	February 1853—January 1859 -	44
Halifax - -	2	August 1852—March 1862 -	February 1853—January 1859, with many gaps.	44
Quebec - -	2	May 1853—June 1861 - -	May 1853—March 1855 / July 1858—January 1859	29
Corfu -	2	September 1852—July 1861 -	June 1853—January 1859 -	37
Gibraltar - -	2	February 1852—March 1862 -	February 1853—January 1859, less 3 months, 1855.	50
Malta - -	2	April 1852—August 1861 -	February 1853—January 1855 (— 3 months). / June 1857 — January 1859	41
Bermuda* - -		May 1852--March 1862 -	February, May, June, and July, 1853. / August 1855—January 1859	47
Bahamas - -	2	September 1852—December 1861	February 1853—January 1859, less July 1853.	40
Hong Kong -	2	January 1853—March 1862 -	February 1853—January 1859, less 2 months, 1857.	39
Jamaica - -	2	June 1852—September 1861 -	February 1853—August 1856 / February 1857—January 1859	40
Barbadoes - -	2	January 1853—March 1862 -	February 1853—January 1859 -	39
Ceylon - -	2	April 1852—March 1862 -	February 1853—January 1859 -	48
Mauritius - -	4	November 1852—December 1861	February 1853—January 1859 -	38
Freemantle -	2	July 1852—December 1855 / February and March 1859	February 1853—December 1855	9
Auckland - -	2	January 1853—April 1862	February 1853—January 1859 -	40
Kingston, Canada West.	2	September 1853—May 1861 -	February 1854—March 1855 / December 1855—January 1859	33
St. Helena - -	2	September 1853—April 1862 -	February 1854–November 1856 / April 1857—January 1859	44
Cape of Good Hope	2	September 1853—March 1862 -	February 1854—January 1859 -	43
Ascension - -	2	September 1858—September 1861	- - - - -	37
British Columbia -	2	December 1859—December 1861	- - - - -	25
Guatemala - -	3	July 1860—September 1860 -	- - - - -	3
Hobart Town -	—	Various abstracts, 1862.		—

* 2 from May 1852, 4 from August 1855.

He further stated that the Army Medical Department (Letter 798) had stated that their records " were available for reference."

Mr. Scott was instructed to submit a further memorandum, giving details of probable cost, and of bulk of the proposed publication.

Read—The following letter :—

Meteorological Office, 116, Victoria Street,
London, S.W., April 7, 1886.

SIR,

WITH this I beg to hand in for the consideration of the Council, four sheets of the North Atlantic Charts *printed on the paper selected for their publication.*

The whole of the charts for August have gone to *press*, and the charts for the first three months are in the lithographer's hands.

Yours, &c.
(Signed) HENRY TOYNBEE.

R. H. Scott, Esq.

Mr. Scott was instructed to obtain from Captain Toynbee an estimate of the time which would be required to complete the printing of the Chart Plates for the first three months.

Submitted—The following Report :

SIR,

Meteorological Office, March 31, 1886.

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 31st March 1886.

The Mercator's Chart referred to (Min. 1885, p. 89), has been constructed, and is in the hands of the printer.

Some progress has been made with the Current Charts for the North Atlantic and South Pacific Oceans for the month of February: 1,426 observations having been already plotted.

I am, &c.

(Signed) C. W. BAILLIE,
Naval Lieutenant, R.N.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE.
Marine Superintendent.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 15 logs had been received, 9 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. W. C. Crutchley, R.N.R.	S.S. "Kaikoura"	Nov. 25, 1885—March 22, 1886.	Plymouth, New Zealand, and home.	1885, p. 29.
Capt. D. Fullarton	"Timaru"	June 26, 1885—March 19, 1886.	London, New Zealand, and home.	1884, p. 118.
Capt. J. Gordon	S.S. "City of Agra."	Jan. 3—March 24, 1886.	Liverpool, Calcutta, and home.	1882, p. 3.
Capt. W. Hird	"Marlborough"	July 28, 1885—March 18, 1886.	London, Otago, and home	1885, p. 10.
Capt. S. Trott Mr. R. Ladd, Navigating Officer.	S.S. "Minia"	Oct. 16, 1885—Feb. 16, 1886.	Cablework in North Atlantic.	1885, p. 92.
Comr. Hon. F. C. P. Vereker, R.N.	H.M.S. "Rambler."	Sept. 1—Dec. 31, 1885.	Surveying in China Seas,	1885, p. 47.
Comr. W. U. Moore, R.N.				1885, p. 27.
Lieut. A. F. Balfour, R.N.				1885, p. 47.
027 Capt. S. P. H. Atkinson.	Barque "Edmonton."	Oct. 16, 1885—Feb. 16, 1886.	To Acapulco, Pisagua, and home.	—
027 Staff-Comr. E. S. Clapp, R.N.	Schooner "Richmond."	Oct. 10, 1885—Feb. 10, 1886.	At the Bahamas	— 1885, p. 83.
Mr. H. K. Sturdee, Acting Captain and then Chief Officer.				
027 Capt. B. C. Lewis Capt. E. J. Molony	"British Merchant."	April 23, 1885—March 21, 1886.	Liverpool, Calcutta, and Dundee.	— 1885, p. 3.

Mr. Scott was instructed to present the Charts (O. 27) to Captain Atkinson, Staff-Commander Clapp and Captain Lewis, and to convey the best thanks of the Council to the above observers.

Submitted—The following statements of work during March 1886:—

MARINE ROOM.

Examined 21 new logs and 4 lighthouse registers.

April 6, 1886.

North Atlantic Weather Charts.

The charts for November 1882 reduced by eidograph, and progress made with the reduction of December.

Reduced charts to end of October completed and sent to lithographer for reproduction.

Received from lithographer proofs of charts to September 11.

Passed for press the charts for August 1882.

Generalized winds entered for March and April 1883.

The female clerks employed entirely on the reduction of charts. One of the staff on sick leave for one-half of the month.

General.

Indexing data in ocean 10° squares.

The Marine Superintendent. (Signed) CHAS HARDING.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE,
Marine Superintendent.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To 31st March 1886.)

Monthly Weather Report:—

1885.—*December* (with Appendix II.). Printed and revised. Will be published very shortly, with preface, &c.

1886.—*January*. Printed and partly revised.

February. Tables and maps (in rough) prepared.

Checking of Daily Forecasts (3.30 p.m. and 8 p.m.)—Complete to date.

Checking Storm Warnings issued in 1885.—Done to end of August.

Calculation of Mean Aggregate Values for Accumulated Heat, Rainfall, and Bright Sunshine from the beginning of the Year to the end of each Week.—Done to a month in advance of current part of the year.

Tables of Mean Values for all Telegraphic Reporting Stations for Quarterly Weather Report, 1878.—*January* done and handed in; *February* almost complete.

Report on the Prevalence of Gales on the British Coasts during years 1871–84.

Gales grouped for the whole period, and summarised to end of 1878.

(Signed) FREDC. GASTER.

April 1, 1886.

PANTAGRAPH ROOM.

Observatory Returns.—The daily, five-daily, and monthly means of pressure and temperature; the calculation of the Vapour Tension values for each hour; and the copying of the hourly values for November 1883 finished and sent to press. The proof of "Hourly Readings" for October, partly revised.

Harmonic Analyser.—The analysis of the barograms for the seven observatories for 1872 completed, and about two-sevenths of the curves for 1873 passed through the instrument. A memorandum on the machine, and the work done with it, has been prepared.

Krakatoa Air Wave.—The preparation of the tables nearly completed; but nothing has been done to them since March 19, by direction of the Chairman.

Quarterly Weather Report.—The letter-press of Part I., 1878, is in hand, but not far advanced. The chart plates for the Part ready for printer.

A good deal of time has been occupied in putting in order the pantagraphs, which had been dismounted owing to repair of the room.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

SIR, April 1, 1886.

THE following is a report of the work done in this department during the month of March 1886:—

Examinations.

December (1883).—Six *thermograms.*
Six *barograms.*
Seven *anemograms.*

Reports.

Notes of errors for Valencia, Aberdeen, Falmouth, Stonyhurst, and Kew for November 1883, and report thereon to the Meteorological Council.

Miscellaneous.

The weekly examinations, &c., of curves and documents and re-arranging curves and documents for all stations in drawers.

I am, &c.
(Signed) T. E. ALLEN.

R. H. Scott, Esq., F.R.S.

Reported—That on the 8th January a letter (No. 75) had been received from General Hazen asking for reports from the Fastnet Rock to be telegraphed daily to Washington at the expense of the Chief Signal Office.

In reply it had been stated (P.C. 63) that no reports could be forwarded from the Fastnet, as there were no instruments on the Rock, but that reports could be furnished from Valencia if required.

A further letter had been received (No. 805) accepting this offer.

Mr. Scott was instructed to arrange to have the reports forwarded to Washington as directed.

Authority was given to order six coast standard barometers for fishing stations. Cost 33*l.*

Submitted—The following report on the forecasts for March 1886 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

March.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	67	74	71	91
,,	b	26	15	20	
,,	c	0	7	4	
,,	d	7	4	5	
Scotland, E.	a	52	56	54	86
,,	b	30	33	32	
,,	c	11	7	9	
,,	d	7	4	5	
England, N.E.	a	44	63	54	85
,,	b	37	26	31	
,,	c	15	4	10	
,,	d	4	7	5	
England, E.	a	52	52	52	84
,,	b	33	30	32	
,,	c	4	7	5	
,,	d	11	11	11	
Midland Cos.	a	37	59	48	78
,,	b	37	22	30	
,,	c	19	8	13	
,,	d	7	11	9	
England, S.	a	56	56	56	87
,,	b	29	33	31	
,,	c	15	0	8	
,,	d	0	11	5	
Scotland, W.	a	56	70	63	84
,,	b	33	8	21	
,,	c	7	7	7	
,,	d	4	15	9	
England, N.W.	a	48	74	61	89
,,	b	41	15	28	
,,	c	7	4	6	
,,	d	4	7	5	
England, S.W.	a	52	56	54	84
,,	b	33	26	30	
,,	c	8	11	9	
,,	d	7	7	7	
Ireland, N.	a	48	70	59	89
,,	b	41	19	30	
,,	c	7	0	4	
,,	d	4	11	7	
Ireland, S.	a	52	81	67	91
,,	b	37	11	24	
,,	c	7	8	7	
,,	d	4	0	2	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecasts.	Percentage of Success a + b.
Scotland, N.	a	58	68	63	94
,,	b	36	26	31	
,,	c	6	3	5	
,,	d	0	3	1	
Scotland, E.	a	42	65	54	86
,,	b	42	23	32	
,,	c	13	6	10	
,,	d	3	6	4	
England, N.E.	a	42	55	49	79
,,	b	35	26	30	
,,	c	23	13	18	
,,	d	0	6	3	
England, E.	a	49	45	47	84
,,	b	42	32	37	
,,	c	6	13	10	
,,	d	3	10	6	
Midland Cos.	a	39	49	44	78
,,	b	39	29	34	
,,	c	16	16	16	
,,	d	6	6	6	
England, S.	a	61	47	54	82
,,	b	23	33	28	
,,	c	13	13	13	
,,	d	3	7	5	
Scotland, W.	a	45	48	47	78
,,	b	36	26	31	
,,	c	19	13	16	
,,	d	0	13	6	
England, N.W.	a	49	61	55	80
,,	b	29	20	25	
,,	c	19	0	9	
,,	d	3	19	11	
England, S.W.	a	55	42	49	75
,,	b	26	26	26	
,,	c	19	16	17	
,,	d	0	16	8	
Ireland, N.	a	52	55	54	85
,,	b	36	26	31	
,,	c	6	6	6	
,,	d	6	13	9	
Ireland, S.	a	47	60	54	84
,,	b	40	20	30	
,,	c	3	17	10	
,,	d	10	3	6	

Summary.

British Isles	a	51	65	58	86
,,	b	34	21	28	
,,	c	9	6	7	
,,	d	6	8	7	

British Isles	a	49	54	52	82
,,	b	35	28	30	
,,	c	13	11	12	
,,	d	3	9	6	

SUBMITTED---The following STATEMENT respecting the RECORDS for December 1883, received from the SELF-RECORDING OBSERVATORIES (see Minutes, 21st December 1868 and 20th November 1876).

—	Aberdeen.		Armagh.		Falmouth.		Glasgow.		Kew.		Stonyhurst.		Valencia.	
ANEMOGRAPH :—														
Action	Direction. Good.	Velocity. Good.	Direction. Indifft.	Velocity. Indifft.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Good.	Velocity. Good.	Direction. Indifft.	Velocity. Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	1	2	12	14	0	0	0	0
„ „ other causes	0	0	*3 hrs.	*3 hrs.	†3 hrs.	†4 hrs.	0	0	0	0	‡5 hrs.	0	‖40	0
Orientation verified	27th	—	—	—	8th	—	4th	—	—	—	19th	—	8th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	1	1	0	1	2	0	1	25	3	0	1	3	3	6
Result of 40 *Remeasurements* :—														
Greatest difference	0·0	2·0	0·0	3·0	1·0	1·0	0·0	1·0	1·0	1·0	0·0	2·0	1·0	2·0
Mean difference irrespective of sign	0·0	0·5	0·0	0·4	0·0	0·5	0·0	0·3	0·1	0·2	0·0	0·5	0·1	0·7
Residual difference (—Meteorological Office)	0·0	0·0	0·0	+0·1	0·0	0·0	0·0	0·0	0·0	−0·1	0·0	+0·2	+0·1	0·0
RAIN GAUGE :—														
Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		0		0		0		0	
„ „ other causes	0		0		0		0		0		0		0	
Errors in tabulation	0		3		0		1		1		1		3	

BAROGRAPH :—							
Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.
Photography	Do.	Indifferent.	Indifferent.	Bad.	Do.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	0	0	1 hr.	0
„ „ failure of light	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0
No. of errors discovered—							
In entry of standard	0	1	0	8	2	5	0
„ calculating residual correction	1	2	2	6	2	0	0
„ applying residual correction	0	0	0	22	0	1	0
„ subtraction in subsidiary tables	0	0	0	6	2	1	0
„ tabulation by subsidiaries	0	0	0	0	0	0	0
„ „ irregular differences	0	0	4	0	3	3	3
Result of 40 *Remeasurements :—*							
Greatest difference	·005	·005	·005	·006	·005	·007	·009
Mean difference irrespective of sign	·002	·002	·002	·002	·002	·002	·004
Residual difference (—Meteorological Office)	·000	·000	·000	—·001	+·001	—·001	+·002
Mean monthly difference between simultaneous Barograph and Barometer readings	·002	·002	·001	·002	·002	·001	·002

THERMOGRAPH :—																
Action	Good.		Good.		Good.		Good.		Good.		Good.		Good.			
Photography	Do.		Indifferent.		Do.		Indifferent.		Do.		Do.		Indifferent.			
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.		
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0	0	0	6	6		
„ „ failure of light	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
„ „ imperfectly moistened bulbs	—	0	—	1 hr.	—	0	—	0	—	3 hrs.	—	10	—	0		
„ „ partially frozen bulbs	—	10	—	4 hrs.	—	28 hrs.	—	0	—	14	—	32	—	0		
„ „ other causes	0	0	¶1 hr.	¶1 hr.	0	0	§1 hr.	0	0	**2	0	0	¶4	¶4		
No. of errors discovered in entry of Standard	0	0	0	1	0	0	0	1	0	2	0	0	0	0		
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
„ „ of subtraction in do. tables	0	0	2	1	0	1	4	2	2	3	1	0	0	0		
„ „ detected under glass scale	0	0	0	0	3	0	0	0	0	1	0	0	0	0		
Result of 40 *Remeasurements :—*																
Greatest difference	0·2	0·2	0·3	0·4	0·3	0·2	0·2	0·2	0·4	0·2	0·3	0·3	0·4	0·2		
Mean difference irrespective of sign	0·1	0·1	0·1	0·2	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·2	0·1		
Residual difference (—Meteorological Office)	+0·1	0·0	0·0	—0·2	—0·1	0·0	0·0	+0·1	0·0	0·0	0·0	0·0	—0·2	—0·1		
Mean monthly difference between simultaneous Thermograph and Thermometer readings	0·1	0·2	0·1	0·2	0·1	0·1	0·1	0·1	0·1	0·2	0·1	0·2	0·1	0·1		
No. of errors in maxima and minima	0	—	5	—	3	—	4	—	4	—	8	—	2	—		

* Cleaning instrument. † Omitted to damp cylinder. ‡ Wheel raised. § Instrument interfered with. || Failure of trace.
¶ Clock-line broke. ** Fitting gas-burner.

Reported—That the following cheques had been drawn during the month of March :—

1886.		£	s.	d.	£	s.	d.
March 1st	For late attendance for telegraphy -	-		-	13	16	0
„ 6th	For weekly salaries - - -	-		-	15	1	0
„ „	Postmaster General, telegrams -	-		-	139	11	3
„ 13th	For weekly salaries - - -	-		-	15	1	0
„ 17th	Pickford & Co., carriage of parcels -	-		-	3	17	5
„ „	Pall Mall Coal Co., coals - -	-		-	5	10	0
„ „	J. L. Rose, nephoscope - -	-		-	5	4	3
„ „	Anglo-American Telegraph Co., telegrams	-		-	3	3	2
„ „	Kew Committee, cloud observations, &c.	-		-	90	8	11
„ „	T. E. Allen, tabulations for Falmouth	-		-	5	6	6
„ „	Wightman & Co., printing - -	-		-	7	12	6
„ „	L. P. Casella, repairing instruments -	-		-	1	15	0
„ 20th	For weekly salaries - - -	-		-	15	1	0
„ 27th	„ „ - - -	-		-	15	1	0
„ 31st	General R. Strachey, R.E., salary -	289	7	7			
„ „	Professor G. H. Darwin, fees - -	148	17	7			
„ „	F. Galton, fees - - -	148	17	7			
„ „	Professor G. G. Stokes, fees - -	148	17	7			
„ „	E. J. Stone, fees - - -	148	17	7			
„ „	Captain W. J. L. Wharton, R.N., fees	78	1	4			
					962	19	3
„ „	R. H. Scott - - - -	Salaries			66	13	4
„ „	J. S. Harding, junr. - - -				27	15	6
„ „	T. D. Bell - - - -				15	0	0
„ „	J. Sheerman - - - -				10	0	0
„ „	J. E. Cullum - - - -				16	13	4
„ „	R. H. Curtis - - - -				22	10	0
„ „	J. A. Curtis - - - -				17	10	0
„ „	T. E. Allen - - - -				16	5	0
„ „	C. H. Thompson - - -				11	13	4
„ „	S. Call - - - -				10	16	8
„ „	E. G. Aldridge - - -				8	15	0
„ „	R. G. Canham - - - -				6	13	4
„ „	A. H. Bell - - - -				6	13	4
„ „	F. Gaster - - - -				25	6	3
„ „	F. J. Brodie - - - -				17	6	10
„ „	G. G. Francis - - - -				16	17	6
„ „	A. J. Rigby - - - -				16	8	1
„ „	R. Sargeant - - - -				11	5	0
„ „	A. R. Simpkins - - -				9	7	6
„ „	H. J. Stevens - - - -				8	6	8
„ „	Capt. H. Toynbee - - -				33	6	8
„ „	Nav.-Lieut. C. W. Baillie, R.N. -				20	16	8
„ „	R. Strachan - - - -				27	15	6
„ „	C. Harding - - - -				22	10	0
„ „	H. Harries - - - -				14	3	4
„ „	W. Allingham - - -				14	3	4
„ „	W. G. James - - - -				10	8	8
„ „	F. T. Bullen - - - -				8	15	0
„ „	R. F. Wallace - - - -				7	18	4
„ „	G. J. Mayhew, rent - - -	158	15	0			
„ „	Pall Mall Coal Co., coals - -	5	15	0			
					164	10	0
„ „	R. F. Wallace, furniture - -	-		-	3	12	0
„ „	General Life and Fire Assurance Co., insurance - - - -	1	6	0			
„ „	„ „ -	1	2	0			
					2	8	0

Carried forward - - - £

1886.		£	s.	d.	£	s.	d.
	Brought forward -	-		-	1,971	12	5
March 31st.	J. S. Harding, senr., pension - -	-		-	10	14	1
„ „	W. Thomas, care of Scilly anemometer	1	13	1			
„ „	„ meteorological reports -	4	18	8			
					6	11	9
„ „	H. Williams, care of bridled anemometer - - - -	2	14	2			
„ „	H. Williams, care of Robinson's anemometer - - - -	2	11	4			
					5	5	6
„ „	Scottish Meteorological Society, Ben Nevis observations, 1885–6 - -	-		-	100	0	0
„ „	C. Niven, Aberdeen Observatory -	62	9	6			
„ „	J. L. E. Dreyer, Armagh Observatory -	12	10	0			
„ „	W. L. Fox, Falmouth „ -	61	19	6			
„ „	R. Grant, Glasgow „ -	18	15	0			
„ „	Kew Committee, allowance - -	100	0	0			
„ „	W. I. Fortescue, Orkney - -	2	10	0			
„ „	S. J. Perry, Stonyhurst - -	15	7	4			
„ „	J. E. Cullum, Valencia - -	43	17	8			
					317	9	0
„ „	G. T. Watson, care of Yarmouth anemometer - - - -	3	18	6			
„ „	G. T. Watson, meteorological reports -	4	12	6			
					8	11	0
„ „	H. Todd, Cambridge - - -	4	11	0			
„ „	H. Mohn, Christiania - -	5	10	0			
„ „	W. Brand, Dunrossness - -	3	18	6			
„ „	P. Curnow, Dungeness- - -	4	13	6			
„ „	W. Bunce, Hawes Junction - -	1	19	3			
„ „	S. Richards, Holyhead - -	3	18	6			
„ „	G. G. Appleton, Hurst Castle - -	3	18	9			
„ „	J. Fisher, Jersey - - -	4	5	6			
„ „	F. Gaster, London - - -	3	18	0			
„ „	W. Berridge, Loughborough - -	3	5	8			
„ „	Secretary of Lloyd's, for Malin Head -	3	5	0			
„ „	K. Kerr, Mullaghmore - -	5	5	0			
„ „	A. Penny, Nairn - - -	4	4	6			
„ „	W. Wickham, Oxford - - -	3	12	6			
„ „	B. Budds, Parsonstown - -	3	7	6			
„ „	J. John, Prawle Point - - -	3	5	0			
„ „	S. Blake, St. Ann's Head - -	3	6	8			
„ „	J. B. Smith, Spurn Head - -	3	5	5			
„ „	D. Macdonald, Stornoway - -	5	12	6			
„ „	J. Sinclair, Wick - - -	3	5	0			
„ „	F. Guy, York - - - -	3	18	0			
					82	5	9
„ „	H.M. Postmaster-General, wire at Mullaghmore - - - -	-		-	31	5	0
„ „	A. Buchan, salary - - -	37	10	0			
„ „	W. C. Ley „ - - -	37	10	0			
					75	0	0
„ „	J. R. Jones, Aberdeen agent - -	6	13	1			
„ „	L. Allen, Dundee „ - -	2	10	0			
„ „	D. McGregor & Co., Glasgow agents -	7	18	11			
„ „	Z. Scaping, Hull - - -	1	7	6			
„ „	J. Gill, Liverpool - - -	18	2	6			
					36	12	0
	Carried forward -	-		-	2,645	6	6

			£	s.	d.	£	s.	d.
1886.		Brought forward -	-		-	2,645	6	6
March 31st.	P. Adie, tabulating scales, &c. -		0	16	6			
,, ,,	,, repairing barometers, &c. -		1	9	6			
,, ,,	,, ,, ,, -		12	3	4			
,, ,,	,, ,, ,, -		11	4	9			
						25	14	1
,, ,,	J. H. Woodstock, packing cases -		-		-	3	9	6
,, ,,	T. De La Rue & Co., sunshine cards -		-		-	15	12	6
,, ,,	R. H. Curtis, thermograph scale values		-		-	2	10	0
,, ,,	Williams & Norgate, books - -		-		-	3	17	4
,, ,,	F. Gaster, payment of allowances for late attendance - - -		-		-	15	13	9
,, ,,	J. S. Harding, junr., petty cash -		-		-	40	0	0
						£ 2,715	13	8

116, *Victoria Street, April* 21, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN. | PROFESSOR STOKES.

The Secretary was in attendance.

The Minutes of the last meeting (April 7) were read and confirmed.

Read—The following letter (Minutes, p. 1):—

(M.O. 941.)

Kew Observatory, Richmond, Surrey,
April 14, 1886.

DEAR MR. SCOTT,

IN reply to yours, M.O. No. 863, of the 8th instant, I beg to submit a detailed estimate of the annual cost of working the electrograph.

No charge has hitherto been made on your Office on this account, it having been considered a part set off against the sum of 150*l.* per annum granted to this Observatory in addition to the annual allowance of 250*l.* as one of the self-recording observatories.

I am, &c.
(Signed) G. M. WHIPPLE,
Superintendent.

ESTIMATE for WORKING ELECTROGRAPH at the KEW OBSERVATORY for One Year.

	£	s.	d.
Photographic paper, 183 slips or $2\frac{3}{4}$ quires - - - -	3	10	0
Chemicals for development and fixing - - - - -	2	0	0
Assistant's time for changing, developing, charging water can, and writing up curves, 210 hours at 1*s.* - - - - - -	10	10	0
Consumption of gas, about 36,000 feet - - - - -	6	7	0
Determining scale value, adjustments, cleaning, and repairs - -	2	0	0
	£24	7	0
Tabulation of curves as per special estimate - - - -	£5	0	0

Resolved—That one of these instruments be procured (P.C. 1017).

Submitted—The following letter (Minutes, p. 2):—

Meteorological Office, 116, Victoria Street,
London, S.W., April 21, 1886.

SIR,

I HAVE the honour to report, for the information of the Council, that Messrs. Dangerfield hope to have the charts of August, September, and October 1882 printed off by the end of May.

I submit herewith some notes explanatory of the charts, which I think should appear with any issue of them.

I shall also be glad to know whether the Council contemplate publishing maps showing the tracks of depressions, or inserting any discussion, and if so, whether the discussion is to accompany or follow the issue of the charts.

It may also be well to decide what recognition, if any, is to be given of the work of the observers, who are about 3,000 in number, many of them being foreigners.

The observations are generally very good.

I am, &c.
(Signed) HENRY TOYNBEE,
Marine Superintendent.

R. H. Scott, Esq., Secretary,
Meteorological Office.

EXPLANATORY NOTES of the NORTH ATLANTIC WEATHER CHARTS.

The accompanying charts which represent the weather over the North Atlantic and the adjacent continents, have been prepared for the 13 months beginning August 1st, 1882, and ending August 31st, 1883, the period during which the International system of circumpolar observations was carried out.

The charts, which are on the conical projection, were originally drawn on a much larger scale, giving 1 inch to 180 nautical miles, and the observations of barometer, wind, weather, and air and sea temperature from each ship have been plotted in position. From these working charts two charts have been reduced for each day, on which the generalized data are represented.

In all 11,236 returns have been received from about 3,000 vessels. The number of returns for the several months are as follows:—

1882	August	826
	September	881
	October	932
	November	861
	December	849
1883	January	787
	February	835
	March	927
	April	964
	May	905
	June	841
	July	843
	August	785

These yield on an average rather more than 400 ships' observations for each day's chart, in addition to which daily observations from about 250 land stations have been used.

The observations from the various circumpolar stations which lie within the limits of the chart, combined with those which lie beyond those limits, have rendered the northern part of the data much more complete than it otherwise would have been.

The following is an explanation of the several elements dealt with:—

BAROMETER.—Isobars, or lines of equal barometric pressure, are drawn for each tenth of an inch. The line corresponding to 29·9 inches is given thicker than the rest to facilitate comparison. A broken line is used to indicate probability in cases where the observations do not justify greater certainty. A dotted line is used occasionally for an isobar representing half a tenth of an inch, but only where this degree of refinement adds materially to the value of the chart. Figures given occasionally in the central area of a depression show the lowest reading of the barometer recorded by vessels over which the disturbance passed.

WIND.—The arrows fly with the wind. The scale of the chart is too small to admit of every individual arrow being shown, and a generalization has been made, in many cases an arrow represents as many as ten or more independent observations. Where vessels are numerous, even though they are chiefly steamers, there is a most satisfactory agreement in the recorded direction and force of wind. At some stations, in the neighbourhood of mountains, the recorded wind is often directly opposed to the prevailing current of air as shown by ships outside. This is no doubt a back draught from the wind which has passed over high land lying to windward of the station. The wind at Funchal, Madeira, is often so influenced.

The winds at high-level stations, given in red, are all at elevations of 4,000 feet or upwards. The heights of these stations are shown on the key-chart.

WEATHER.—The weather shading is given on both of the daily charts to facilitate comparison with the different elements. The shading shows the position of rain, fog, or mist. Snow is classed under the head of rain, whilst hail and drizzle are grouped with passing showers. Broadly speaking, those parts of the ocean having a wind-arrow without shading, may be supposed to have fine weather.

AIR TEMPERATURE.—Air isotherms, or lines of equal air temperature, are given in red, for each 5° Fahrenheit over the sea, and for each 10° over the land; a broken line indicates doubt.

Values are occasionally given without lines, and in this case the temperature is that for the position of the figures.

At a few stations the air temperature has not been available at the hour mentioned on the charts. These stations are distinguished by a note on the key-chart.

SEA TEMPERATURE.—Sea isotherms or lines of equal sea surface temperature, are given in black for each 5° Fahrenheit. As with the air, values are occasionally given without lines, and refer to the position of the figures.

KEY-CHART.—The key-chart gives the names of the various circumpolar stations, also of mountain stations with their heights, and of islands or coast stations which have not been employed in the drawing of isobars and isotherms by the North American or European meteorological authorities in preparing their daily chart, from which charts most of our land data are obtained.

The Chairman stated that he would submit for the approval of the Council a revised memorandum in the above sense for publication with the charts.

Mr. Scott reported that it was found that the barograms furnished by the new argentic-gelatino-bromide process had a tendency to curl up, rendering it difficult to preserve them in a flat state. He submitted the following correspondence as to a mode of overcoming this defect, and as to its probable influence on the scales of the curves :—

(M.O. 760.) Kew Observatory, Richmond, Surrey,
DEAR MR. SCOTT, March 25, 1886.

WITH reference to the rolling up of the photographic (A.G.B. paper) curves which has been complained of, I beg to submit herewith specimens of curves which have been waxed and ironed subsequent to development and fixing.

They are found to be quite unaffected by the process so far as regards distortion or stretching, and will now be seen to be as free from liability to roll up as the old waxed paper sheets.

Mr. Sanford undertakes to treat any other curves that may be submitted to him for the purpose in the same manner, at the cost of 1*l.* 5*s.* 0*d.* per hundred, or in smaller quantities at 2*s.* 6*d.* per dozen.

The curves submitted are second curves, and were blurred where marked with × before they were sent to him for waxing.

Yours, &c.
(Signed) G. M. WHIPPLE.

Kew Observatory, Richmond, Surrey,
DEAR MR. SCOTT, April 7, 1886.

MR. SANFORD has just brought down a few more gelatine curves which he has waxed, and as they are so good, I send them up for the inspection of the Council in addition to those I delivered on the 25th March. He tells me that he has now quite overcome the difficulties he met with at first, but does not think he can do them at a lower rate than that I quoted in my last letter.

Yours, &c.
(Signed) G. M. WHIPPLE.

P.S.—Mr. Sanford's address is:
88, Godolphin Road,
Shepherd's Bush, W.

MEMORANDUM.

WAXED BAROGRAMS.

SIR, April 9, 1886.

IN accordance with your verbal instructions, I have measured the length of the barograms (on A.G.B. paper), which have been waxed to prevent curling.

I find that in every instance the curve is *too short*, the amount of the error varying from 20 *minutes* to nearly *half an hour*.

As these are all "*second*" curves, I measured the "*firsts*" to compare with them. These were also rather short, but the error was less than half that of the waxed A.G.B. sheets.

Of six Kew "first" curves for, I think, September 1885, measured at the same time, three were found to be of correct length, two a trifle short, and one as much too long.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

MEMORANDUM.

VARIATIONS in the LENGTH of BAROGRAMS.

SIR, April 19, 1886.

AS requested, I have had a further series of measurements made of Kew barograph curves of various dates, with the view of ascertaining the variation in their length, and of comparing in this respect the curves obtained by the old waxed-paper process with those got by the use of the gelatino-bromide paper in its unwaxed state.

First, all the old waxed-paper curves from the beginning of August 1883 till the new A.G.B. paper was introduced in November of that year, were dealt with.

These curves were 33 in number, and of them 25 were correct in length, 6 were too short, and 2 were too long. Both the long curves "*bagged*" badly.

The largest minus error was five minutes, and the largest plus error 10 minutes. Bagging (beyond a certain limit) occurred in 32 per cent. of the curves.

Of the argentic-gelatino-bromide curves, 212 were measured, the selection representing the whole interval during which the paper has been used.

Of the 212 only 54 were correct as regards length, 152 were too short (three minutes and upwards), and six were too long. The percentage of curves in which "bagging" occurred, tested as before, was 30.

The greatest *minus* error was 13 minutes, and the greatest *plus* error five minutes.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

It was resolved to reconsider this subject.

Mr. Scott submitted a draft of a paper on the work of the harmonic analyser (Minutes, 1885, p. 109), which was referred to Professor Stokes.

Submitted—The following memorandum (Minutes, p. 2):—

Land Room, April 20, 1886.

PROPOSED PUBLICATION of OBSERVATIONS made by the ROYAL ENGINEERS at various FOREIGN STATIONS.

IF all the observations now stored in the Meteorological Office are published as proposed, I find they will make a volume of about 128 quarto pages. There will be 186 sheets (Form B), each containing the information for one station for one year, or part of a year.

The cost of preparing the sheets for the printer will vary with the amount of work done If (A) the monthly means, &c., &c., be simply copied, the cost will be about 3*s.* per sheet. If (B) the yearly averages are worked out, the cost would be increased by about 1*s.* per sheet. If (C), in addition, the monthly summaries of weather are obtained, the cost will be still further increased by about 1*s.* 6*d.* per sheet. Thus the cost—

	£	*s.*	*d.*
If A only is done, will be about - - - -	27	18	0
If A and B are done, will be about - - -	37	4	0
If A, B, and C are done, will be about - - -	51	3	0

This estimate includes the cost of checking in each case, but is exclusive of any data that may be received from the Army Medical Department.

R. H. Scott, Esq. (Signed) J. A. CURTIS.

18	Barometer.		Air Temperature.									Tension of Vapour.		Relative Humidity.	
			Dry-bulb.		Means of		Mean Temp.	Absolute Min. and Max.							
	9.30a.m.	3.30p.m.	9.30a.m.	3.30p.m.	Min.	Max.		Min.	Date.	Max.	Date.	9.30a.m.	3.30p.m.	9.30a.m.	3.30p.m.
January - -	29·882	29·828	84·0	85·0	82·7	78·5	86·8	75·5	30th	89·0	13th	·803	·809	70·8	69·5
February - -															
March, &c. - -															

(*continued*).

18	Amount of Cloud.		Rainfall.			Weather, No. of Days of							Wind, No. of Observations of *							
	9.30a.m.	3.30p.m.	Total.	Max.	Day.	Rain.	Snow.	Hail.	Thunder-storms.	Clear Sky.	Overcast.	Gale.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.
January - -	6·0	7·0	6·685	2·000	28th								6	8	20	7	1	3	5	12	
February - -																					
March, &c. - -																					

The Estimate A provides for the copying of the data as shown above for the 12 months.
" B " in addition for the yearly totals and averages.
" C includes also the preparation of the summary of days of weather.

* NOTE.—This summary of wind-direction takes no account of calms, which is contrary to modern practice.

The consideration of this was postponed until a report should have been received on the returns from the Army Medical Department.

The increments to the "classified" clerks, referred to on Minutes, 1884–85, pp. 118–9, were allowed, the salaries which are changed for the current year are the following:—

CLASS I.—Maximum £275.

	Salary in 1886–7.
	£
F. Gaster - - -	275
C. Harding - - -	275
R. H. Curtis - - -	275
J. A. Curtis - - -	215

CLASS II.—Maximum £200.

	Salary in 1886–87. £
T. E. Allen	200
F. J. Brodie	190
G. G. Francis	185
T. D. Bell	185
A. J. Rigby	180
H. Harries	175
W. Allingham	175

CLASS III.—Maximum £150.

C. H. Thompson	145
S. Call	135
W. G. James	130
J. Sheerman	125
R. Sargeant	125

CLASS IV.—Maximum £110.

F. T. Bullen	110
E. G. Aldridge	110
H. J. Stevens	105
A. R. Simpkins	105
R. F. Wallace	100
A. H. Bell	85
R. G. Canham	85

In the case of the "unclassified" and female clerks, the following alterations were made, to date from the 29th March :—

C. W. Heinemann to receive 18*s.* 6*d.* a week
E. J. Hood „ 18*s.* 6*d.* „
W. H. Parsons „ 20*s.* „

the addition, in the last case, to be in lieu of the former allowance of 5*s.* a week for setting up forecasts, &c., hitherto paid separately, which will no longer be recognized.

C. Pycock to receive 14*s.* 6*d.* a week

the addition to be in lieu of an allowance of 1*s.* 6*d.* a week for assistance in printing, which will no longer be recognized.

C. A. Bracey to receive 17*s.* a week.
H. G. Brown „ 14*s.* „
L. H. Powers „ 13*s.* „

Miss E. D. Anderson to receive 1*l.* 12*s.* 6*d.* a week.
Miss M. S. Harris „ 1*l.* 2*s.* 6*d.* „

Read—A memorandum from Captain Toynbee reporting that since the last meeting 11 logs had been received, five of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. A. Campbell	S.S. "Circassia"	Oct. 9, 1885—April 7, 1886.	Five voyages to and from New York.	1885, p. 46.
Capt. F. H. Crotty	"Evesham Abbey."	May 18, 1885—April 1, 1886.	Liverpool, Calcutta, and home.	1884, p. 113.
Comr. R. F. Hoskyn, R.N. Sub.-Lt. F. Bowden Smith, R.N.	H.M.S. "Myrmidon."	Nov. 1, 1885—Feb. 28, 1886.	Surveying on Australian station.	1885, p. 96
Capt. S. G. Jones	Barque "Hermine."	Jan. 20, 1885—March 29, 1886.	Liverpool, Vancouver Island, and home.	1884, p. 49.
Capt. W. Scott	Barque "Commewyne."	Oct. 5, 1885—April 3, 1886.	Glasgow to Surinam and home.	1885, p. 47.

Mr. Scott was instructed to present the Charts (O. 27) to Sub-Lieutenant F. Bowden Smith, and to convey the best thanks of the Council to the other observers.

Mr. Scott reported that additional book-cases for logs and books were required, and he submitted estimates from Mr. Bond for two, at the prices of 21*l.* 19*s.* 6*d.* and 25*l.* 1*s.* 3*d.*—Respectively authorised.

Submitted—The following statement of accounts for the year ended 31st March 1886:—

Income.	£ s. d.	£ s. d.
Balance from year 1884–85		1,265 9 8
Proportion of vote		15,300 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	6 8 7	
(2.) Special researches	30 16 6	
(3.) Observatories and stations	19 13 8	
		56 18 9
Supply of Weather Information:		
D.W. Charts and Forecasts	254 13 10	
6 p.m. Charts	31 5 0	
Information for Press Agencies, &c.	86 5 2	
Telegrams	242 8 3	
Miscellaneous data	14 16 0	
		629 8 3
Sale of Instruments, &c.:		
Royal Navy account	6 2 6	
Mercantile Marine account	66 3 6	
		72 6 0
Commission charged on work done for Colonies, &c.		19 11 9
		£17,343 14 5

Expenditure.	£ s. d.	£ s. d.
Administration:		
Payment of Council	1,000 0 0	
Secretary	800 0 0	
Salaries and wages	769 19 0	
Rent, fuel, and lighting	707 5 10	
Furniture and fittings	74 4 4	
Incidental and contingent expenses	355 10 8	
Expenses incidental to International Meteorological Congress	17 13 4	
Pensions	42 16 4	
		3,767 9 6
Special Researches:		
Salaries:—		
Harmonic analysis	120 15 0	
Atlantic Synchronous work	200 13 4	
Sunshine records	33 2 6	
Anemometers: Scilly and Holyhead	17 7 0	
Atlantic Weather Reports	50 17 2	
Ben Nevis observations	100 0 0	
Cloud observations	170 0 11	
General Strachey's Developing Instrument (additions)	19 10 0	
Mr. Galton's Compound Aneroid	15 0 0	
Helm wind observations	23 18 0	
Sundry small items	8 0 1	
		759 4 0
Land Meteorology:		
Observatories and stations	1,861 10 1	
Salaries — Discussion and reduction of observations	1,318 5 1	
		3,179 15 2
Weather Information and Forecasts:		
Telegraphic reports and storm warnings	3,030 5 1	
Salaries — Preparation and issue of reports and forecasts	1,583 18 9	
		4,614 3 10
Inspections:		
Salaries and travelling expenses		549 9 9
Ocean Meteorology:		
Salaries — Discussion and reduction of observations	1,823 15 0	
Expenses incidental to the supply of instruments:		
Proportion for care and issue of instruments	200 0 0	
Royal Navy	341 19 11	
Mercantile Marine	532 2 4	
Distant island and coast stations	20 7 0	
		2,918 4 3
Balance		1,555 7 11
		£17,343 14 5

Liabilities.	£ s. d.	Assets.	£ s. d.
To contracts or work uncompleted	125 0 0	By cash at Bank	2,141 13 0
„ Post Office (partly estimated)	431 16 8	„ „ at Office	73 7 8
„ sundry creditors	257 7 0	„ „ at Valencia	50 0 0
„ balance	1,555 7 11	„ sundry debtors	104 10 11
	£2,369 11 7		£2,369 11 7

116, *Victoria Street, May* 5, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
PROFESSOR STOKES.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (April 21) were read and confirmed.

Submitted—The following memorandum with reference to the relative advantages of the new and old processes of photography (Minutes, p. 12) :—

REPORT on the comparative RESULTS of the WAXED PAPER and ARGENTIC GELATINO-BROMIDE PROCESSES of PHOTOGRAPHY in use at the OBSERVATORIES.

SIR,

IN accordance with your request, and after due examination of several months' curves treated by the two processes, I beg to report that *with equal perfection* in the focussing of the instruments, photography, &c. (irrespective of the time occupied), I should give the preference to the waxed paper.

Experience, however, proves that such perfection as a rule is unattainable, and the result by the "A.G.B." process generally is superior to the waxed paper, owing to the comparative immunity from losses by photographic imperfections, such as discolouration, blemishes, stains, &c.

The objections to the "A.G.B." process are:—

(*a.*) Extreme sensitiveness of the film.

(*b.*) The image being printed only on the film, instead of on the paper.

(*c.*) Curling of the paper when warm.

That the *first* objection can be overcome is proved by the curves now received from Falmouth; the *second* demands the exercise of care; and the *third* I believe Mr. Whipple has succeeded in reducing.

Judging by the curves now received from the observatories, I must give the preference to the "A.G.B." paper.

I am, &c.

R. H. Scott, Esq. (Signed) T. E. ALLEN.

It was resolved that no change be made in the treatment of the photograms.

Submitted—The following statement of the available balances during five years ending 31st March 1886, with reference to the statement of accounts for the year (Minutes, p. 15) :—

The balances are those shown by the "adjusted" accounts of income and expenditure on the Minutes of the respective years, and with a view to the explanation of the fluctuations of the balances, the expenditure shown by the same accounts under Special Researches, Observatories and Stations, Mercantile Marine, and Telegraphic Reports and Storm Warnings, is given below, as the changes made under these heads of service have chiefly affected the accounts of the years in question.

	£
Balance on the 31*st March* 1882 - - - - - - - -	1,103

In this year the vote was 15,000*l.* (only), and the available balance of the previous year was *reduced* by about 300*l.* This was chiefly due to the charges under Researches being unusually high. The balloon observations, and loss of the balloon, amounting to 246*l.*, and rainfall observations to 200*l.*

Balance on the 31*st March* 1883 - - - - - - - -	884

In this year the vote reached its present amount, viz. 15,300*l.* Still the balance of the previous year was again *reduced* by about 220*l.*, notwithstanding that the amount under Special Researches was rather low. The decreased balance is apparently due to gradual increase under various heads, especially Furniture and Fittings (about 130*l.*), Telegraphy, and Mercantile Marine (about 250*l.*), consequent on the collection of synchronous observations.

£

Balance on the 31*st March* 1884 - - - - - - - - 821

The available balance fell still further by about 65*l.*, notwithstanding that the amount under Special Researches was exceptionally low. It was quite evident that the expenditure had been considerably exceeding the income for the last three years. There would have been an equally large reduction of the balance this year, but for the stoppage of some of the observatories, which effected an ultimate saving of 600*l.* a year, a fourth of which became available for the current year.

Balance on the 31*st March* 1885 - - - - - - - - 1,256

The effect of the reduction of the expense of the observatories is evident, for although Special Researches have in this year amounted to their normal figure (1,000*l.*) owing to special charges for sea temperature charts (145*l.*), and "Principles of Forecasting" (114*l.*), the available balance rose by nearly 450*l.* in place of the deficits previously existing.

Balance on the 31st *March* 1886 - - - - - - - - 1,555

The balance has still further increased by nearly 300*l.* although (1) the charges under observatories have been 100*l.* larger than in the previous year; (2) increments to salaries amounted to nearly 100*l.*; and (3) an increase of about 230*l.* under Mercantile Marine, as compared with last year. As a set off against these charges there has been a considerable reduction in the cost of telegrams, amounting to over 200*l.* in the current year. As before stated (Minutes 1885, p. 115), this reduction will eventually amount to not less than 500*l.* a year.

EXPENDITURE under Heads specified.

Head of Service.	1881–2.	1882–3.	1883–4.	1884–5.	1885–6.
	£	£	£	£	£
Special Researches - -	1,107	767	686	998	759
Observatories - - -	2,576	2,548	2,433	1,760	1,861
Mercantile Marine - -	345	594	606	305	532
Telegraphy - - -	3,131	3,244	3,233	3,151	3,030
Total - - -	7,159	7,153	6,958	6,214	6,182

R. H. Scott, Esq. (Signed) J. S. HARDING, Jun.

It was resolved that in view of the increasing surplus in recent years, further consideration should now be given to the possibility of carrying out improved methods of observation, or extending the system now in force, or otherwise adding to the efficiency of the Office (Minutes 1882, p. 60, 1883, p. 76).

Read—A memorandum from Captain Toynbee reporting that since the last meeting 4 logs had been received, 3 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention in Minutes.
Capt. W. Spratley -	S.S. "Mozart" -	Sept. 22, 1885—March 27, 1886.	Antwerp, East Coast of South America, New York, and home.	1885, p. 47.
Capt. A. S. Baxter -	"City of York"	March 31, 1885—April 25, 1886.	Middlesborough and Sydney, New South Wales.	—
Capt. C. Crowley -	Barque "Lucia"	Oct. 3, 1883—April 24, 1886.	London, China, and home.	—

Mr. Scott was instructed to present the Charts (O. 27) to Captains Baxter and Crowley, and to convey the best thanks of the Council to Captain Spratley.

Submitted—The following :—

RETURN of the RESULT of the COMPARISON between the WARNINGS ISSUED and the WEATHER EXPERIENCED in 1885.

Coasts.	Total No. of Orders to Hoist and Repetitions.	Warnings justified by subsequent Gales, Force 8 and upwards.	Warnings justified by subsequent strong Winds, Forces 6 and 7.	Warnings not justified by subsequent Weather.	Warnings late, Force 9, reached at two Stations before issue.	Warnings partially late, Force 9, reached at one Station before issue.	Warnings in Error, owing to Telegraphic Mistakes	Storms for which no Warning was issued.
Ireland, south -	74	47	16	10	—	1	—	Jan. 28, Feb. 6, April 5.
„ east - -	79	32	27	20	—	—	—	April 5.
Scotland, east -	65	42	13	9	—	1	—	Apl. 20,* Sept. 30, Oct. 1.*
„ west -	56	29	14	12	—	1	—	
England, north-west -	78	39	18	19	1	1	—	Jan. 28.†
„ west -	65	41	10	12	—	2	—	Oct. 4.
„ south -	79	46	18	15	—	—	—	Feb. 8, ‡Aug. 12,‡ Oct. 4.
„ south-east -	36	24	6	6	—	—	—	
„ east -	59	27	20	12	—	—	—	
Totals - -	591	327	142	115	1	6	0	
Percentages -	—	55·3	24·0	19·5	0·2	1·0	—	
„ 1884 -	461	66·4	20·0	12·1	0	1·1	0·4	

* These gales were not felt south of Aberdeen.
† Warnings issued too late to be of any practical use.
‡ Warnings issued to Devon and Cornwall only; gale extended up Channel.

NOTES, as to the GALES NOT WARNED, for 1885.

January 28.—*Gale in Ireland, S., and England, N.W.*—There was no definite indication of this at 6 p.m. 27th, and its advance was so rapid that on 8 a.m. 28th, the depression's centre was close to Mullaghmore. At Valencia the maximum force occurred at 4 a.m. 28th.

February 6.—*Gale in Ireland, S.*—No indication at 6 p.m. 5th, when the barometer was still rising in the West, with moderate Westerly breezes. Depression advanced so rapidly that Valencia had extreme force at 3 a.m. 6th.

February 8.—*Gales in England, S.*—The south-west coasts of England were warned on 7th, and at 8 a.m. there was no indication of the gale spreading up Channel. During the day, however, a remarkable local disturbance was developed over the Irish Sea, and the gale consequently spread all over England. The 8th, being a Sunday, there were no 2 p.m. reports, and no "special" telegrams could be obtained, or the Channel might have been warned.

April 5.—*Gale in Ireland, S. and E.*—There were no indications whatever at 6 p.m. 4th, of advance of this gale.

April 20.—*Gale in Scotland, E. (north of Nairn).*—Strong winds were anticipated, and mentioned in the forecasts; even now I can see no sufficient reason in the conditions prevailing prior to the gale for anticipating its occurrence to the northward of Nairn.

August 12.—*Southerly Gale in England, S*—Strong winds were anticipated and mentioned in forecasts; the depression, however, moved in a more easterly direction than was anticipated, and the gale spread up the Channel.

September 30 *and October* 1.—*Gale in Scotland, E.*—The depression advanced so much more rapidly than was expected, that although the west of Scotland was warned on 29th, the east was not, and the gale spread to that coast during the earlier part of the 30th.

October 4 *(night).*—*Gale in England, S.*—On looking over the charts again I cannot see why the gale should have occurred. Apparently a very shallow local depression moved eastwards over our southern counties, but could scarcely have been expected to cause so much wind with the moderate gradients which existed previously.

F. G.

It was resolved that Mr. Scott should report as to the practicability of laying before the Council at their regular meetings reports of warnings given since last meeting, and of any failures to issue them in sufficient time, or of their unnecessary issue.

Submitted—The following report on the forecasts for April 1886 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

APRIL, 1886.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	56	60	58	84
,,	b	28	24	26	
,,	c	12	8	10	
,,	d	4	8	6	
Scotland, E.	a	60	60	60	82
,,	b	20	24	22	
,,	c	12	8	10	
,,	d	8	8	8	
England, N.E.	a	60	68	64	88
,,	b	32	16	24	
,,	c	4	12	8	
,,	d	4	4	4	
England, E.	a	56	72	64	92
,,	b	36	20	28	
,,	c	8	4	6	
,,	d	0	4	2	
Midland Cos.	a	56	60	58	86
,,	b	28	28	28	
,,	c	12	8	10	
,,	d	4	4	4	
England, S.	a	60	64	62	84
,,	b	24	20	22	
,,	c	12	8	10	
,,	d	4	8	6	
Scotland, W.	a	44	76	60	82
,,	b	28	16	22	
,,	c	20	8	14	
,,	d	8	0	4	
England, N.W.	a	56	60	58	86
,,	b	28	28	28	
,,	c	12	12	12	
,,	d	4	0	2	
England, S.W.	a	44	56	50	82
,,	b	40	24	32	
,,	c	12	12	12	
,,	d	4	8	6	
Ireland, N.	a	48	64	56	88
,,	b	36	28	32	
,,	c	8	8	8	
,,	d	8	0	4	
Ireland, S.	a	52	68	60	84
,,	b	28	20	24	
,,	c	12	8	10	
,,	d	8	4	6	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	57	53	55	87
,,	b	27	37	32	
,,	c	10	7	9	
,,	d	6	3	4	
Scotland, E.	a	54	47	51	81
,,	b	33	27	30	
,,	c	10	26	18	
,,	d	3	0	1	
England, N.E.	a	60	47	54	75
,,	b	23	20	21	
,,	c	10	20	15	
,,	d	7	13	10	
England, E.	a	63	40	52	87
,,	b	27	43	35	
,,	c	7	10	8	
,,	d	3	7	5	
Midland Cos.	a	60	40	50	82
,,	b	24	40	32	
,,	c	13	13	13	
,,	d	3	7	5	
England, S.	a	57	50	54	86
,,	b	27	37	32	
,,	c	13	10	11	
,,	d	3	3	3	
Scotland, W.	a	47	60	54	87
,,	b	40	27	33	
,,	c	7	10	9	
,,	d	6	3	4	
England, N.W.	a	57	50	54	87
,,	b	27	40	33	
,,	c	10	7	9	
,,	d	6	3	4	
England, S.W.	a	50	50	50	76
,,	b	27	24	26	
,,	c	23	23	23	
,,	d	0	3	1	
Ireland, N.	a	40	54	47	92
,,	b	50	40	45	
,,	c	7	3	5	
,,	d	3	3	3	
Ireland, S.	a	44	47	46	86
,,	b	43	37	40	
,,	c	10	10	10	
,,	d	3	6	4	

SUMMARY.

British Isles	a	54	64	59	86
,,	b	30	23	27	
,,	c	11	9	10	
,,	d	5	4	4	
British Isles	a	54	49	52	84
,,	b	31	34	32	
,,	c	11	13	12	
,,	d	4	4	4	

Submitted—The following statements of work during April 1886:—

MARINE ROOM.

May 5, 1886.

Examined 16 new logs and 1 light-house register.

North Atlantic Weather Charts.

The charts for December 1882 reduced by eidograph, and the reduction of January 1883 commenced.

Received from the lithographer, proofs of charts to September 20, 1882.

Charts passed for press to September 11.

Progress made in entering generalized winds for May, 1883.

The female clerks engaged on the reduction of charts and preparing them for the lithographer.

General.

Discussion of Red Sea observations for the month of July.

Copying the observations contained in a rough book, into log No. 6399.

Indexing data in ocean 10-degree squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

To 30th April 1886.

Monthly Weather Report.—1885 completed, printed, and published. 1886, *January*, completed and published. *February*, in printer's hands. *March*, in hand; will probably be ready for printer by 5th or 6th.

Weekly and Daily Weather Reports.—All published to date. Since April 7, a new paragraph has been added to each Daily Weather Report (on p. 4), giving a summary of the distribution of pressure, temperature, wind, and weather over the Continent, on the morning of the previous day, as shown by the charts in the *Bulletin International, Paris.*

Quarterly Summary of Weekly Weather Report, for first quarter of 1886.—Completed and in printer's hands.

Checking of Daily Forecasts (3.30 p.m. and 8.30 p.m.).—Complete to date.

Calculation of Mean Aggregate Values for Accumulated Heat, Rainfall, and Bright Sunshine, from the beginning of the year to end of each week.—Done to end of 36th week, or four months in advance of present date.

Tables of Mean Values for all the Telegraphic Reporting Stations for the Quarterly Weather Report, 1878.—February and March completed and handed in.

Report on the Prevalence of Gales on British Coasts during the 15 years 1871–85. Same as at end of March. Completion standing over till checking of Storm Warnings, 1885, is done.

**Checking of Storm Warnings issued in* 1885.—Collection of information complete. Summary now in hand; (see p .

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

May 1, 1886.

Quarterly Weather Report.—The "General Summary" for Part I., 1878, completed, and the monthly charts drawn. The gale tables are nearly completed. The chart plates are being lithographed.

Observatory Returns.—The daily and other means of pressure and temperature completed for December 1883. The hourly vapour tension values for the same month are calculated, but not checked, and the "Hourly Readings" are very nearly ready for the printer.

Harmonic Analyser.—The analysis of the barograms for 1873 completed as far as Falmouth. A good deal of time occupied upon the preparation of the paper on the working of the Analyser.

Krakatoa Air Wave.—The checking and copying of the tables, and the transcript of the report on this matter, is in hand.

Miscellaneous.—A zinc plate has been engraved, with reduced copies of several barograms for squall of January 13, 1886. A memorandum prepared on length of barograms on A.G.B. paper and another on Falmouth rain-gauge. Two months' sunshine cards have been dated and examined this month.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

* This would be complete already, but for the intervention of the Easter holidays.

EXAMINATION ROOM.

SIR, May 1, 1886.

DURING the past month, the work done has included the following:—

Examinations.

January 1884:—Three *thermograms* one *barogram*.

Partial examination of the Valencia *thermograms* and *barograms* for January to March, 1886, for the Registrar-General of Ireland.

Rainfall curves of Armagh, Falmouth, and Aberdeen for the year 1885, and of Kew for April–December, 1885.

Reports, &c.

Notes of errors to Valencia, Aberdeen, Falmouth, Stonyhurst, and Kew for December 1883, and report thereon to Council.

Investigation and report *re* Beckley's rain-gauge.

Miscellaneous.

The weekly examinations, &c. of curves and documents.

The Easter vacation and Mr. Aldridge's absence (6½ days), owing to the death of his father, have somewhat interfered with the progress of the work.

I am, &c.
(Signed) T. E. ALLEN.

R. H. Scott, Esq.

Reported—That the following cheques had been drawn during the month of April:—

1886.			£	s.	d.
April 3rd	For payment of weekly salaries		15	1	0
,, 7th	T. Rossiter, Norfolk Island		7	1	8
,, ,,	Negretti & Zambra, instruments and repairs		31	15	0
,, ,,	Anglo-American Telegraph Co., telegrams		5	1	0
,, ,,	J. J. Hicks, hand anemometer		26	9	6
,, ,,	R. Jenkin, thermometer screen		2	0	0
,, 10th	For payment of weekly salaries		15	1	0
,, 17th	,, ,, ,,		15	1	0
,, 22nd	Royal Meteorological Society, observations		16	13	4
,, ,,	H.M. Postmaster General, telegrams		164	16	8
,, ,,	Kew Committee, verifications		14	10	0
,, 24th	For payment of weekly salaries		15	1	0
,, ,,	Gas Light and Coke Co., gas		11	9	3
,, ,,	R. H. Scott, secretary		66	13	4
,, ,,	J. S. Harding, jun.	"Office" salaries	27	15	6
,, ,,	T. D. Bell	"Office" salaries	15	8	4
,, ,,	J. Sheerman, salary, harmonic analysis		10	8	4
,, ,,	J. E. Cullum, ,, Valencia observatory		16	13	4
,, ,,	R. H. Curtis	Salaries (discussion, &c. of observations)	22	18	4
,, ,,	J. A. Curtis		17	18	4
,, ,,	T. E. Allen		16	13	4
,, ,,	C. H. Thompson		12	1	8
,, ,,	S. Call		11	5	0
,, ,,	E. G. Aldridge		9	3	4
,, ,,	R. G. Canham		7	1	8
,, ,,	A. H. Bell		7	1	8
,, ,,	F. Gaster	Salaries (preparation, &c. of Weather Reports)	25	15	7
,, ,,	F. J. Brodie		17	16	3
,, ,,	G. G. Francis		17	6	10
,, ,,	A. J. Rigby		16	17	6
,, ,,	R. Sargeant		11	14	4
,, ,,	A. R. Simpkins		9	16	10
,, ,,	H. J. Stevens		8	15	0
	Carried forward		£689	4	11

1886.			£	s.	d.
		Brought forward - - -	689	4	11
April 24th	Capt. H. Toynbee	Salaries (discussion, &c. of observations and care of instruments).	33	6	8
„ „	Lieut. C. W. Baillie, R.N. -		20	16	8
„ „	R. Strachan -		27	15	6
„ „	C. Harding -		22	18	4
„ „	H. Harries -		14	11	8
„ „	W. Allingham -		14	11	8
„ „	W. G. James -		10	16	8
„ „	F. T. Bullen -		9	3	4
„ „	R. F. Wallace -		8	6	8
„ 30th	J. Green, Bermuda - - - - -		4	9	0
„ „	F. Gaster, for payment of allowances for late evening and Sunday attendance - - - -		16	17	11
„ „	J. S. Harding, petty cash - - - -		50	0	0
			£922	19	0

116, *Victoria Street, May* 19, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 5) were read and confirmed.

The first draft of the Report of the Office for the year 1885–6 was submitted, and it was resolved that it be taken into consideration at next meeting.

Professor Stokes gave an account of the methods to which he had been led for the reduction of cloud photographs, which aimed at the saving of labour without sacrificing accuracy (Minutes, 1885, p. 100), and stated that the matter was still in progress. There seemed, however, to be every reason to think that the photographs of clouds would give trustworthy information as to the motions going on in the higher regions of the atmosphere.

It was resolved that Mr. Whipple be requested to go on with the observations on favourable occasions. (P.C. 1239.)

Mr. Darwin stated to the Council that, in his opinion, the only direction in which any immediate improvement in the forecasts could be looked for was in the increase in the amount of telegraphic information, especially in the evening. The morning information with regard to Germany and Central Europe appeared also to be somewhat deficient. He (Mr. Darwin) had learned from Mr. Scott that such data might be obtained from Hamburg by way of exchange. Telegraphic data with regard to the Iberian Peninsula was also entirely absent, with the exception of the reports from Corunna, which arrived most irregularly. Information from that region being most valuable, while there is no prospect of securing a satisfactory transmission of the despatches over the Spanish land lines, Mr. Scott might ascertain the probable cost of daily despatches from Lisbon, over the Eastern Telegraph line, to Porthcurnow, and thence to London.

It was resolved that Mr. Scott submit a memorandum indicating the European stations, reports from which would be desirable additions to the information, and specifying the stations from which the reports would be wanted twice, and which only once a day, and that he institute inquiries as to the Lisbon reports.

Mr. Darwin also suggested that in cases where the conditions were such as to render the formulation of a definite forecast difficult, and necessarily very dubious, it is expedient that the attempt to give a definite forecast be made somewhat less frequently than at present. The feasibility of attributing to the forecasts some sort of estimate of the degree of certainty was also discussed, and it was suggested that the statement of the conditions with regard to the situations and paths of the cyclonic and anticyclonic areas might be associated with the forecasts more immediately than at present, by making it a kind of preamble to the forecast.

The subject of the utility of reading the barometer to greater minuteness than 0·01 inch was discussed; and Mr. Scott was instructed to inform the leading authorities in meteorology at home and abroad that the Council had it in contemplation to abandon the practice of requiring their observers to read to 0·001 inch, and to inquire if they had any observations to offer on the subject. (P.C. 1150.)

Submitted—The following memorandum (Minutes, p. 13) :—

RETURNS from ARMY MEDICAL DEPARTMENT.

Land Room, May 19, 1886.

I HAVE examined and sorted the meteorological returns recently received from the Army Medical Department and find that they comprise observations made at 57 different stations between the years 1866 and 1884 inclusive.

Of these stations 28 are situated in the British Islands, and the remaining 29 are at various military depôts abroad, 14 of them being stations from which we already have observations made at the Royal Engineers in earlier years, see Minutes, page 2.

The observations were taken twice daily, namely at 9 a.m. and at 3 p.m., and include readings of the barometer, and of the dry-bulb and wet-bulb thermometers; maximum and minimum temperatures (including solar maxima and grass minima); wind, direction and force, and in some cases the daily run, in miles, by Robinson's anemometer; cloud amount; rainfall, on the ground and at a height; and ozone, with daily remarks on the weather.

The monthly sums and means have all been obtained, and the corrections for instrumental error, &c. applied.

With regard to the publication of these returns, I find that if the observations at the whole of the foreign stations are published in the form suggested for the Royal Engineer observations (Minutes, page 13), they will occupy about 204 4to pages, 305 sheets being required, each giving the information for one station, for one year or part of a year.

The cost of copying these returns for the printer will be rather less than in the case of the Royal Engineer observations, and will, I estimate, be as follows:—

	s.	d.		£	s.	d.
305 sheets at	2	6	(A) =	38	2	6
	3	6	(B) =	53	17	6
	5	0	(C) =	76	5	0

Complete lists of the returns are appended.

(Signed) JOHN A. CURTIS

R. H. Scott, Esq.

Read—A memorandum from Captain Toynbee, reporting that since the last meeting 8 logs had been received, 5 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. J. I. Dunbar -	S.S. "Arracan"	Jan. 30,—May 5, 1886.	Rangoon and home, viâ Suez.	1885, p. 88.
Capt. C. W. Kennedy.	S.S. "Germanic"	Oct. 23, 1885—April 2, 1886.	Five voyages to and from New York.	1885, p. 67.
Capt. J. F. L. P. Maclear, R.N. Sub-Lieut. W. O. Lyne, R.N.	H.M.S. "Flying Fish."	Nov. 18, 1885—March 9, 1886.	Surveying in China Sea -	1885, p. 103.
Capt. J. W. Sheldrake.	"Iron Cross" -	June 21, 1885—March 27, 1886.	Liverpool, India, New York.	1885, p. 19.
Capt. A. Simpson - (No. 90,671.)	S.S. "Australasian."	Dec. 24, 1885—April 30, 1886.	Plymouth, Cape, Melbourne, Bombay, home viâ Suez.	1885, p. 88.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

METEOROLOGICAL RETURNS received from the ARMY MEDICAL DEPARTMENT.

FOREIGN.

Stations.	No. of Observations per Day.	Dates.	Period.	No. of Months missing.
Auckland, N.Z.	2	January 1866—June 1869	3 years 6 months	—
Bahamas (Nassau)	2	January 1866—August 1866 August 1868—December 1884*	17 „ 1 „	4
Barbadoes	2	January 1866—June 1881 February 1882—December 1883	17 „ 5 „	—
Bermuda	2	January 1866—December 1884*	19 „ – „	5
Cape Town	2	October 1870—July 1875	4 „ 10 „	—
Ceylon, Colombo	2	January 1866—July 1875*	9 „ 7 „	7
„ Kandy	2	January 1866—July 1875	9 „ 7 „	—
„ Newera Ellia	2	January 1866—July 1872	6 „ 7 „	—
„ Trincomalee	2	April 1865—July 1875	10 „ 4 „	—
Cyprus, Nicosia	2	November 1880—June 1884*	3 „ 8 „	11
„ Polymedia	2	February 1879—December 1884*	5 „ 11 „	21
„ Troodos	2	July 1880—September 1884*	4 „ 3 „	32
Gambia	2	January 1869—December 1869	1 „ – „	—
Gibraltar	2	January 1866—December 1884*	19 „ – „	5
Graham's Town	2	August 1867—June 1870	2 „ 11 „	—
Halifax, U.S.	2	January 1866—July 1875*	9 „ 7 „	1
Honduras	2	March 1866—April 1870	4 „ 2 „	—
Hong Kong	2	January 1866—December 1884	19 „ – „	—
Jamaica, Newcastle	2	January 1866—December 1884*	19 „ – „	3
„ Up Park Camp	2	January 1866—December 1884*	19 „ – „	11
Malta	2	January 1866—December 1884	19 „ – „	—
Natal, Fort Napier	2	September 1868—December 1884*	16 „ 4 „	6
Newfoundland	2	January 1866—August 1870*	4 „ 8 „	2
Quebec	2	January 1866—September 1870	4 „ 9 „	—
St. Helena	2	April 1867—June 1867	– „ 3 „	—
Singapore	2	March 1868—April 1869* April 1871—December 1884	14 „ 9 „	2
Scutari	2	January 1866—December 1884	19 „ – „	—
Sierra Leone	2	October 1874—December 1884	10 „ 3 „	—
Thunder Bay (Lake Superior)	2	July 1870—August 1870	– „ 2 „	—

BRITISH ISLANDS.

Aberdeen	2	January 1866—April 1869	3 years 4 months	—
Aldershot	2	January 1866—July 1875	9 „ 7 „	—
Athlone	2	January 1866—July 1875	9 „ 7 „	—
Belfast	2	January 1866—July 1875*	9 „ 7 „	6
Buttevant	2	January 1866—July 1875*	9 „ 7 „	6
Canterbury	2	January 1866—July 1875	9 „ 7 „	—
Chatham	2	January 1866—July 1875	9 „ 7 „	—
Colchester	2	January 1866—June 1875*	9 „ 6 „	1
Cork	2	January 1866—July 1875	9 „ 7 „	—
Curragh Camp	2	January 1866—July 1875	9 „ 7 „	—
Devonport	2	January 1866—July 1875	9 „ 7 „	—
Dover	2	January 1866—July 1875	9 „ 7 „	—
Dublin	2	January 1866—July 1875	9 „ 7 „	—
Edinburgh	2	January 1866—July 1875*	9 „ 7 „	4
Fermoy	2	January 1867—July 1875*	8 „ 7 „	2
Guernsey	2	January 1866—March 1875	9 „ 3 „	—
Jersey	2	January 1866—July 1875	9 „ 7 „	—
Limerick	2	January 1866—July 1875*	9 „ 7 „	8
Netley	2	January 1866—December 1884	19 „ 0 „	—
Parkhurst	2	January 1866—July 1875*	9 „ 7 „	1
Portsmouth	2	January 1866—July 1875	9 „ 7 „	—
Preston	2	January 1866—April 1875	9 „ 4 „	—
Sheerness	2	January 1866—July 1875	9 „ 7 „	—
Shorncliffe	2	January 1866—July 1875	9 „ 7 „	—
Templemore	2	January 1866—July 1875*	9 „ 7 „	20
Walmer	2	January 1866—February 1869*	3 „ 2 „	2
Winchester	2	January 1866—December 1873*	8 „ 0 „	3
Woolwich	2	January 1866—May 1875*	9 „ 5 „	1

* Incomplete.

Submitted—the following Statement respecting the Records for January 1884, received from the Self-recording Observatories (see Minutes, 21st December 1868 and 20th November 1876):—

	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action	Indifft.	Indifft.	Indifft.	Indifft.	Good	Good	Indifft.	Indifft.	Indifft.	Good.
Records deficient, due to stoppage of clock	0	0	22 hrs.	23 hrs.	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0	*2 hrs.	0	0
Orientation verified	26th	—	—	—	10th	—	4th	—	7th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	0	3	16	0	0	2	1	4	7
Result of 40 *Remeasurements:—*										
Greatest difference	2·0	3·0	0·0	3·0	1·0	2·0	1·0	2·0	3·0	2·0
Mean difference irrespective of sign	0·0	0·7	0·0	0·5	0·0	0·7	0·1	0.3	0·2	0·5
Residual difference (—Meteorological Office)	0·0	+0·1	0·0	0·0	0·0	−0·1	0·0	0·0	−0·2	+0·1

	Aberdeen.	Armagh.	Falmouth.	Kew.	Valencia.
RAIN GAUGE:—					
Action	Good.	Good.	Good.	Good.	Good.
Records deficient, due to stoppage of clock	0	0	0	0	0
„ „ other causes	0	0	0	0	0
Errors in tabulation	0	3	2	3	15

	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH:—				
Action	Good.	Good.	Good.	Good.
Photography	Do.	Indifferent.	Do.	Indifferent.
Records deficient, due to stoppage of clock	0	0	0	0
„ „ failure of light	0	0	0	1 hr.
„ „ other causes	†11 hrs.	‡15 hrs.	0	‡5 hrs.
No. of errors discovered—				
In entry of standard	0	4	6	0
„ calculating residual correction	1	1	0	0
„ applying residual correction	0	0	1	0
„ subtraction in subsidiary tables	0	2	1	0
„ tabulation by subsidiaries	0	0	0	0
„ „ irregular differences	0	1	15	2
Result of 40 *Remeasurements:—*				
Greatest difference	·005	·005	·005	·011
Mean difference irrespective of sign	·002	·002	·002	·003
Residual difference (—Meteorological Office)	·000	·000	·000	+·002
Mean monthly difference between simultaneous barograph and barometer readings	·003	·002	·003	·002

	Aberdeen.		Falmouth.		Kew.		Valencia.	
THERMOGRAPH:—								
Action	Good.		Good.		Good.		Good.	
Photography	Do.		Indifferent.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	1 hr.	1 hr.	0	0	2 hrs.	2 hrs.
„ „ failure of light	0	0	0	0	0	0	4 hrs.	0
„ „ imperfectly moistened bulbs	—	0	—	0	—	0	—	0
„ partially frozen bulbs	—	54	—	0	—	0	—	0
„ other causes	0	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	0	1	1	1	0	1	1
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	1	1	5	0	1	1
„ detected under glass scale	0	0	0	0	0	0	0	1
„ in maxima and minima	0	—	2	—	2	—	2	—
Result of 40 *Remeasurements:—*								
Greatest difference	0·2	0·2	0·2	0·3	0·2	0·2	0·3	0 2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·2	0 1
Residual difference (—Meteorological Office)	+0·1	0·0	−0·1	0·0	0·0	−0·1	−0·1	−0·1
Mean monthly difference between simultaneous thermograph and thermometer readings	0·1	0·2	0·1	0·1	0·2	0·1	0·1	0·1

* Photographing building.

† Neglect of assistant when pressure was remarkably low; trace passed off paper.
‡ Photographic imperfections.

116, *Victoria Street, June* 2, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (May 19) were read and confirmed.

Submitted—The following memorandum as to possible increase in the amount of telegraphic information received daily at the Office, as directed at last meeting:—

The proposals were:—

1. As to the stations reporting at 8 a.m., that—

Christiania	be substituted	for	Oxö.
Ushant	„	„	Brest (St. Mathieu.)
Belfort	„	„	Charleville.
Perpignan	„	„	Corunna.
Nice	„	„	C. Sicié.

And that reports be obtained daily from—

Breslau,	Cassel,	Corunna,*
Dantzic,	Munich,	Lisbon,*

Berlin (each to contain four groups only).

2. As to the stations reporting at 2 p.m.: that Malin Head and Jersey be added to the list, but these additions were deemed to be of less importance than those proposed for 8 a.m. and 6 p.m.

3. As to the stations reporting at 6 p.m.: that Donaghadee and Roches Point (in our Islands), and—

Stockholm	(two groups).	Belfort	(two groups).
The Helder	„	Ushant	„
Cassel	„	Biarritz	„
Paris	„	Corunna	„

(on the Continent), be added to the list.

The least important of these were Stockholm and Belfort, the reports from which would be less valuable than those from the other stations named.

Mr. Scott was instructed to prepare by next meeting an estimate of the probable expense entailed by the changes suggested.

Mr. Scott submitted the following memorandum with reference to the amount of available balance to be anticipated in the next six years:—

FINANCIAL.

IT would appear from the "Statement of the available balances" (Minutes, 5th May, 1886), that if the expenditure remained the same as in 1885–6, there would probably be a saving of 600*l.* in the current year.

But as a set-off against this sum it should be borne in mind that the following amounts may be required to meet the increments proposed by the organization scheme:—

	£
Granted for current year - - - -	147
Proposed for 1887-8 - - - - - -	85
„ 1888-9 - - - - - -	70
„ 1889-90 - - - - - -	60
„ 1890-1 - - - - - -	45
„ 1891-2 - - - - - -	35
Total -	£442

* To be sent direct, viâ the Eastern Telegraph Company.

So that in six years (supposing the expenses to remain as in last year), there might only be (say) 150*l.* available for expenditure—and this again supposes that "Special Researches" will not exceed, on an average, about 750*l.* This statement does not affect the present *balance* of 1,550*l.*, nor the further possible surpluses during the next few years at the rates of expenditure already authorised.

(Signed) J. S. HARDING, Junr.

R. H. Scott, Esq.

With regard to the resolution of the Council (Minutes, p. 18), Mr. Scott reported that a statement as to the warnings issued since the previous meeting, and of any failures to issue them in sufficient time, and of their being issued unnecessarily, could be laid before the Council at each meeting; but the information would necessarily be incomplete, as the anemometric records and log books from lightships will not be available, and, consequently some of the gales occurring during night time may be missed. Some parts of our coasts (such as the east of Ireland) are not so well represented by Telegraphic Reporting Stations as could be wished for this purpose.

It was resolved that such a return should be submitted.

Submitted—The following correspondence:—

(M.O. 1146.)

MON CHER MONSIEUR SCOTT, Paris, 17 Mai 1886.

IL'AVAIT été question avec le Général Hazen d'organiser un service régulier de dépêches journalières avec les États-Unis, et vous aviez eu l'obligéance de vous charger des pourparlers. Je serais très heureux de savoir où en est cette affaire et si elle a chance d'aboutir bientôt.

Votre, &c.
(Signé) E. MASCART.

(P.C. 1163.)

MY DEAR MASCART, Meteorological Office, May 20, 1886.

I AM quite ready, as Secretary to the International Meteorological Committee, to issue a circular as to the suggested American reports, and see how many offices will really join. This Council are not *at present* disposed to join, and you will see from the protocols that I was silent on this point.

I may say that we are not disposed to value the present ship service very highly.

How would you propose to sound the different offices? Should I give a more detailed estimate of cost, than that given by M. Teisserenc de Bort, and if so, how am I to arrive at it?

Our Atlantic charts make us doubt the value of the ship telegrams. We shall have three months of them out in June. I send you a specimen sheet.

Yours, &c.
(Signed) ROBERT H. SCOTT.

(M.O. 1210.)

MON CHER COLLÈGUE, Paris, 25 Mai 1886.

VOUS avez bien voulu me répondre par votre lettre du 21 courant, que le "Meteorological Council" n'est pas d'avis *quant à présent* de participer à l'organisation d'un service de dépêches journalières avec le Signal Office de Washington, en ajoutant que les cartes de l'Atlantique, dont vous m'avez communiqué une épreuve, ne paraissent pas indiquer que ces dépêches soient réellement utiles.

La publication de ces cartes sera du plus grand intérêt, et je crois qu'en les discutant avec soin on arriverait à la conclusion qu'il y a quelque chose à tirer des dépêches d'Amérique, surtout en les combinant avec les renseignements fournis par les navires. Il me semble donc, que, sans prendre aucun engagement pour l'avenir, nous ferions une chose utile pour l'essai de ce service de dépêches. J'ai en ce moment quelques ressources disponibles qui me permettraient d'y participer au moins pour une année, et je serais très heureux si le Meteorological Office jugeait que l'essai mérite d'être tenté. Si nous attendons pour commencer les réponses des différents états l'entreprise risque beaucoup d'échouer. Il vaudrait mieux au contraire organiser la chose d'abord et demander à nos collègues la part qu'ils veulent y prendre. Je vous serais obligé si vous vouliez m'en donner votre avis et consulter au besoin votre Conseil.

Il avait été convenu que vous vous chargeriez de correspondre à ce sujet avec M. le Général Hazen. Avez-vous fait quelque chose ou bien la question est-elle restée au point où elle se trouvait lors de la réunion du Comité à Paris.

Votre, &c.
À Monsieur R. Scott. (Signé) E. MASCART.

Mr. Scott was instructed to circulate among the Council copies of the proceedings at the last meeting of the International Meteorological Committee in Paris, with reference to the subject of telegrams from America.

Submitted—The following reports on the results of the service of Atlantic telegrams (Minutes, 1885, p. 1) :—

SIR, Meteorological Office, June 2, 1886.

THE accompanying table contains—

(1.) The dates and the substance of all the "storm telegrams" received from the Chief Signal Officer, U.S., between 26th September 1885 and 31st March 1886. They are all grouped to the various depressions to which they refer ;

(2.) A statement as to whether or not depressions reached the north-western shores of Europe which appeared referable to any of those indicated in the telegrams ; also the dates when such disturbances reached us ;

(3.) Some notes as to the utility of these reports, as practical aids to the issue of warnings to our coasts ; and

(4.) A list of the depressions which reached the north-west of Europe from the westward, but which do not seem referable to any of those indicated in the United States telegrams.

From this table it appears that during the six months in question there were received by wire from the United States—

Reports from separate ships - - - - - - -		91
The number of depressions and storms to which they referred being - -		38
Of these 38 disturbances, there were—		
Instances in which a depression appeared on this side the Atlantic and which might apparently be referred to the storms signalled -	23	
Instances not followed by such depressions - - -	12	
nstances in which the matter was doubtful - - -	3	
Total - -	38	

Again,—if we take into consideration, also, the dates on which the telegrams were received and those on which the storm arrived (or failed to arrive) on the shores of north-western Europe we find—

No. of cases of "useful" warnings - - - - - -	15
„ „ useless* „ - - - - - -	20
„ „ doubtful „ - - - - - -	3
Total - - -	38

Again,—out of the 38 depressions signalled—

The number indicated by only 1 report was -	16 (giving no idea as to rate of motion).
„ „ 2 reports „ -	9
„ „ 3 „ „ -	6
„ „ 4 (or more) „ „ -	7
Total - - -	38

Lastly, in addition to the depressions above named, there were others which reached the north-west of Europe from the Atlantic, but which cannot be referred to any of those telegraphed—

In all - - - 25

I do not say that the value of these warnings might not be improved, but the above figures are scarcely satisfactory.

I am, &c.

R. H. Scott, Esq., M.A., (Signed) FREDC. GASTER.
Secretary, Meteorological Council.

NOTE.—When the number of reports was insufficient to show the movement of a depression the date given in the column headed "Approximate date when depression might have been expected on this side of the Atlantic," was obtained by allowing for a motion north-eastwards of 20 miles an hour—which is about the average rate.

As a rule a depression which has not arrived within a day on either side of this date is considered to have failed to reach us, but in one or two exceptional cases this rule has been relaxed a little.

* In several cases these warnings were mischievous, in causing alarm at slight changes in pressure which subsequently proved unimportant.

TABLE showing, for the PERIOD SEPTEMBER 26th to MARCH 31st, the TELEGRAMS (relating to STORMS) received from the CHIEF SIGNAL OFFICER, WASHINGTON, and the INDIVIDUAL DEPRESSIONS referred to; together with a STATEMENT as to whether they appeared to reach the NORTH-WESTERN SHORES of EUROPE or not. Also a STATEMENT as to the DEPRESSIONS which reached the NORTH-WEST of EUROPE, but which cannot be referred to those indicated by any of the aforesaid WARNINGS.

Date of Receipt of Cablegram in Meteorological Office.	Lowest Barometer.				Wind in Gale.		Approximate Date when Depression might have been expected on this Side of Atlantic.	Depressions observed apparently referable to those telegraphed.		Notes.	Depressions (causing Gales) travelling from the Westward which appeared on the Coasts of Northern Europe, but are not referable to those telegraphed from the United States.
	Date.	Position. Lat. N.	Position. Long. W.	Reading.	Direction and Limits of Shift.	Extreme Force (0 to 12).		Date.	Coasts first struck.		
1885.	1885.	°	°	Ins.			1885.	1885.			
Sept. 26	Sept. 23 4 a.m.	42	65	29·2	S.E. to S.W.	9	Sept. 29th	Sept. 29th	North-west of British Islands (preceded by smaller system on 28th).	Deep and large disturbance. Strong Southerly and South-westerly gales in our Islands, South-easterly in Norway. *Useful.*	——
„ 26	„ 23 6 „	43	63	29·4	S.E. to W.	9					
„ 28	„ ?23 or 24 4 „	43	60	29·5	S.W. to W.	10					
Oct. 2	„ 28 Noon	43	61	30·0	N.E.	10	Oct. 4th* (if at all).	Oct. 4th*	North-west of British Isles. (No gale of importance.)	This depression was large and rather deep, but its gradients were not steep. * The United States observations give no indication that the gale was travelling, and report *a North-easterly* gale, whereas the winds with us were South-westerly. *Doubtful.*	Oct. 2. South-west to North-west gales over the United Kingdom.
„ 3	„ 29 8 a.m.	42	62	29·8	E.N.E.	10					
„ 11	Oct. 9 Noon	43	64	29·8	N.E. to N.W.	8	Oct. 15th or 16th (all one gale).	—	Apparently did not reach us. The depression in south-west on 16th came from the Mediterranean and Africa.	An anticyclone in north-west and north probably kept this depression off. *Useless.* *The four reports received on 15th and 20th would have been too late, even if the gale had arrived.*	Oct. 8. West to North-west gales in west and south. Oct. 9. Strong South-west to North-west gales in south-west and south, followed by Northerly gales in east (on 10th night).
„ 12	„ 9 7 p.m.	42	63	29·4	N.E. to N.W.	10					
„ 13	„ 9 4 „	42	65	29·6	N.E. to N.	8					
„ 13	„ 10 7 a.m.	43	60	29·4	S.W. to N.W.	10					
„ 15	„ 10 4 p.m.	44	57	29·4	S.W. to N.W.	10					
„ 16	„ 10 11 „	47	52	29·1	S.E. to S.	11					
„ 16	„ 10 Midnt.	45	51	29·3	S.W. to N.W.	9					
„ 20	„ 11 Noon	48	45	29·4	S.W. to N.W.	8					
„ 20	„ 16 1 a.m.	43	36	29·7	S.W. to W.	9	Oct. 18th or 19th (motion unknown)	—	Did not arrive - -	*Had gale arrived telegram would have been too late to be of any use.* *Useless.*	Oct. 21. Moderate south-east to south-west gales in France; no gale on our coasts, but very bad weather.
Nov. 2	„ 30 5 p.m.	42	65	29·3	S.E. to N.W.	10	Nov. 5th or 6th (motion rapid).	Nov. 6th	Hebrides and north-west Scotland.	No gales. *Useless.*	Oct. 25–26. Deep. Westerly gales in north-west, west, and south. Oct. 27. Deep. Westerly gales in most places.
„ 3	„ 30 8 „	43	60	29·5	S.W. to N.E.	9					

(*Continued.*)

(*Table continued.*)

Date of Receipt of Cablegram in Meteorological Office.	Lowest Barometer.				Wind in Gale.		Approximate Date when Depression might have been expected on this Side of Atlantic.	Depressions observed apparently referable to those telegraphed.		Notes.	Depressions (causing Gales) travelling from the Westward which appeared on the Coasts of Northern Europe, but are not referable to those telegraphed from the United States.
	Date.	Position. Lat. N.	Position. Long. W.	Reading.	Direction and Limits of Shift.	Extreme Force (0 to 12).		Date.	Coasts first struck.		
1885.	1885.	°	°	Ins.	S.		1885.	1885.			
Nov. 7	Nov. 3 Noon	42	61	29·6	S. to N.W.	10	Nov. 9th	—	Did not arrive - -	- - - - - *Useless*	Oct. 30. Southerly gales in west. (Also several other large depressions between Nov. 1 and 5, but without any serious gales.) Nov. 13. Southerly to Westerly gales in Scotland and Scandinavia. Deep and large.
	„ 3 „	41	60	29·6	S. to W.	11					
	„ 3 1 p.m.	43	60	29·6	S.E. to N.W.	10					
„ 13	„ 11 4 a.m.	41	68	29·6	N.W.	8	Nov. 16th or 17th	Nov. 17th	There were two systems on 17th, one off north-west of Norway, the other over the Bay of Biscay. *Which is the one signalled?*	South-easterly and Easterly gales in south-west, south, and south-east.— *Useful, but reports received on 16th and 17th too late.*	Nov. 17. Large in far north. Strong gales over Scandinavia; none in our Islands.
„ 14	„ 11 Noon	41	64	29·4	N.W.	10					
„ 16	„ 11 3 a.m.	44	55	28·8	S. to N.W.	9					
	„ 12 4 „	46	48	29·4	S. to N.W.	8					
„ 17	„ 12 4 „	46	51	29·5	S.E. to W.	10					
„ 20	„ 15 6 p.m.	44	58	29·6	S.E. to W.	9	Nov. 20th or 21st	Night of Nov. 20th.	South-west coasts of British Isles.	Strong South-easterly winds, no gales. There was another depression which struck north-west of Norway at same time; no gale. Which is system indicated? *Useless.*	—
„ 21	„ 16 Noon	42	59	29·7	S. to N.W.	9	Nov. 22nd	Nov. 23rd	West of Ireland - -	No gale of importance; nothing above South-east. A second depression reached Lapland same day causing South-west gales in North Scandinavia.—Which is depression indicated? *Useless.*	—
„ 25	„ 20 4 p.m.	45	55	29·4	S.W. to N.W.	8	Nov. 25th	Nov. 25th	Off our south-west coasts -	South-easterly and Easterly gales in north-west and north-east. *Useless. Too late.*	Nov. 26th (morning). West of Ireland, strong South-east to South-west gales.
„ 26	„ 21 Midt.	43	59	29·2	E. to N.E.	9	About Nov. 27th or 28th.	Nov. 27th (evening).	Our western coasts - -	Strong South-westerly and Westerly gales in Ireland and England. *First telegram useful, second too late.*	—
	„ 22 4 a.m.	44	56	29·3	E. to N.E.	10					
„ 28	„ 23 4 „	46	49	29·0	W. to N.W.	10					
	„ 23 10 „	47	47	29·0	S.W. to N.	8					
„ 28	„ 25 9 p.m.	42	65	29·5	S.E. to E.	8	Nov. 29th. Travelling rapidly; centre well south.	Nov. 29th	West of Ireland - -	The telegram received 28th gave no idea of rate of motion, while that of 29th arrived simultaneously with gale. *Useless.*	—
„ 29	„ 25 8 „	42	64	29·3	E. to N.	11					
	„ 26 6 a.m.	43	56	29·4	E. to N.E.	8					

Dec. 5	Dec. 1	7 a.m.	41	62	29·7	N.E.	8	About Dec. 7th	Dec. 6th, 8th	Bay of Biscay - -	There being only one report, we had no information as to rate of motion. Applied average rate. Gales very slight except over Brittany and mouth of Channel. *Useful.*	Dec. 2. South-westerly gales in west, north-west, and north. Dec. 3. Heavy South-west to Westerly gales over British Isles generally. Dec. 5. Southerly to Easterly gales in south-west.
„ 9	„ 4	8 „	44	56	29·6	S.E. to N.W.	10	Dec. 9th	—	—	Did not arrive. *Useless.*	—
	„ 4	4 p.m.	44	53	29·1	N.W.	8					
	„ 5	11 „	42	65	29·3	S. to W.	10	Dec. 12th	Dec. 12th	North of British Isles and Norway.	Large and deep. *Useful.*	Dec. 16. Partial gales in north-west and north.
„ 9	„ 6	2 a.m.	43	63	29·5	S.W.	9					
	„ 6	4 p.m.	42	62	29·4	S.E. to S.W.	9					
„ 11	„ 6	4 a.m.	36	67	29·7	S.W.	9					
	„ 6	5 p.m.	43	61	29·3	S.W. to W.	10					
„ 9	„ 7	7 p.m.	41	69	29·5	W.	8	Dec. 14th	—	—	Did not reach our neighbourhood, although distribution of pressure favoured it. *Useless.*	—
	„ 7	10 „	41	67	29·5	S.W. to N.W.	9					
„ 19	„ 14	Noon	42	61	29·7	S. to W.	8	Dec. 20th	—	—	Did not reach us, but apparently passed northwards, far to westward of Ireland on night of 19th. *Useless.*	—
„ 19	„ 15	6 a.m.	41	64	29·4	S.W. to N.W.	?	Dec. 21st	—	—	Did not reach our coasts. *Useless.*	—
„ 20	„ 15	2 „	42	60	29·5	S.W. to N.W.	9					
„ 22	„ 19	Noon	40	71	29·6	S.W. to N.W.	8	Dec. 27th	Dec. 27th(early)	North-west parts of Scandinavia. System was large and deep, but did not affect our Islands much.	(See next entry.) *Useful.*	Dec. 23. North-west of Norway. Westerly gales over Scandinavia; none on our coasts.
„ 24	„ 19	Midt.	41	68	29·5	S.E. to N.W.	9					
„ 26	„ 22	4 p.m.	44	55	29·4	E. to N.	10					
„ 26	„ 22	8 a.m.	41	64	29·9	S.W. to N.W.	8	? Dec. 28th	Dec. 28th	Extreme north-west of our Islands and west of Norway.	Very large and deep. Followed closely on preceding depression, but track lay further to southward. *Useful.*	—
								1886. Jan. 1st	1886. Jan. 1st			
	„ 26	2 p.m.	42	65	29·1	N.E. to N.	12			Our north-western and northern coasts.	Gales slight. *Useful.*	Dec. 30. Off our northern coasts.
„ 29	„ 26	4 „	43	62	29·3	S. to N.E.	9					
	„ 26	6 „	42	63	29·3	S.E. to N.E.	8					
1886. Jan. 2	„ 29	Noon	45	50	29·6	S. to N.W.	9	Jan. 2nd	Jan. 3rd	Our north-western coasts	South-westerly gales in the west. *Useful.*	Jan. 5. Our northern coasts. Westerly gales. Jan. 6. Our south-western coasts. Gales in south west and over France. Jan. 7. Our north-western and northern coast; strong Southerly to North-westerly gales in those regions. Jan. 10. Gales slight, but winds strong and shifting suddenly.

(*Continued.*)

(Table continued.)

Date of Receipt of Cablegram in Meteorological Office.	Lowest Barometer.				Wind in Gales.		Approximate Date when Depression might have been expected on this Side of Atlantic.	Depressions observed apparently referable to those telegraphed.		Notes.	Depressions (causing Gales) travelling from the Westward which appeared on the Coasts of Northern Europe, but are not referable to those telegraphed from the United States.
	Date.	Position. Lat. N.	Position. Long. W.	Reading.	Direction and Limits of Shift.	Extreme Force (0 to 12).		Date.	Coasts first struck.		
1886.	1886.	°	°	Ins.			1886.	1886.			
Jan. 6	Jan. 5 7 a.m.	41	72	29·6	S.E. to S.W.	9	Jan. 12th	Jan. 12th	Norwegian coast - -	Gales chiefly north-westerly.—*Useful.*	—
„ 9	„ 6 2 p.m.	42	64	29·4	S.E. to N.W.	8					
„ 11	„ 9 Noon	40	72	28·9	S.E. to W.	11	Jan. 14th or 15th (motion rather fast).	Jan. 14th	Off our northern coasts -	Large and deep, but winds not very heavy.—*Telms. of* 11 *and* 12 *useful.*	—
„ 12	„ 9 6 a.m.	40	72	28·7	N.E. to W.	12				„ 15 *useless, too late.*	
	„ 9 11 p.m.	41	64	?28·9	S.E. to S.W.	8					
„ 15	„ 10 10 a.m.	45	54	29·2	S.E.	9					
	„ 10 2 p.m.	45	52	29·4	S. to W.	9					
„ 20	„ 17 6 „	41	67	29·4	E.	9	Jan. 24th	—	—	Did not arrive. *Useless.*	—
„ 22	„ 18 6 a.m.	43	60	29·3	S.W. to N.W.	8					
„ 28	„ 25 Noon	39	72	29·9	E. to N.E.	9	Feb. 1st	Jan. 31st	Our northern coasts - -	Only one report. Rate of motion estimated. North-westerly gale in north-west and west only. *Useful.*	—
„ 31	„ 25 2 p.m.	45	46	29·6	S.W. to W.	10	Jan. 29th	Jan. 29th	Off north of Scotland - -	Telegram 3 days too late. *Useless.*	—
Feb. 3	Feb. 1 8 a.m.	41	68	29·8	S.E. to N.W.	8	Feb. 7th	Feb. 7th	Our extreme north-western coasts.	Large. Gales in extreme north-west and Norway only.—*First useful. Second too late.*	—
„ 7	„ 2 10 p.m.	44	54	29·0	S. to W.	10					
„ 9	„ 5 6 a.m.	44	53	29·3	S. to W.	8	Feb. 10th	Feb. 11th	Far outside our western coasts	No gale on our coasts. Only one report. *Useless.*	—
„ 15	„ 13 4 a.m.	40	73	29·5	E. to S.W.	8	Feb. 20th	Feb. 20th	Outside our north-western coasts.	No gale. *Useless.*	—
„ 16	„ 13 4 „	40	69	29·7	S.E. to S.W.	8					
„ 16	„ 14 4 „	42	70	29·6	S.W. to W.	8	Feb. 21st	—	—	Did not arrive. Only one report. *Useless.*	—
„ 23	„ 20 8 p.m.	41	65	29·1	S.W. to N.W.	9	Feb. 26th	—	—	Did not arrive, but possibly passed northwards a long way to westward of our coasts. Only one report. *Useless.*	—
„ 26	„ 24 8 a.m.	41	68	?29·2 or 30·2	N.W. to N.	8	March 3rd	? March 1	Our south-western coasts.—Possibly travelled fast.	Only one report. It is very doubtful whether this gale is referable to the telegram received. *Very doubtful.*	—

March 2	Feb. 26	Noon	43	67	28·7	S.W. to N.W.	11	March 2nd	March 4th (evening).	Our south-western coasts -	"Complex." Very doubtful whether this gale is referable to the telegrams received. *Very doubtful.*	March 7th. South-easterly gales in west.
	„ 26	10 p.m.	41	66	29·1	S.E. to W.	12					
	„ 27	4 a.m.	42	61	28·8	S.E. to N.W.	10					
„ 3	„ 27	6 „	42	61	28·9	S.E. to W.	10					
„ 4	„ 27	8 „	42	57	28·8	S.W. to N.W.	9					
	„ 27	Midt.	42	59	29·1	N.W. to N.	8					
	March 1	6 p.m.	44	66	28·8	W.	10	March 9th	March 9th	Outside our western coast -	Apparently a large low-pressure area lying over Atlantic, and, in conjunction with high anticyclone in east, causing strong South-easterly gales in Ireland. *Useful.*	—
„ 6	„ 2	10 a.m.	42	61	28·9	N.W.	11					
	„ 2	6 p.m.	42	58	28·7	N.E. to N.W.	11					
	„ 3	1 a.m.	42	58	28·8	N.E.	9					
„ 7	„ 3	Midt.	43	57	28·8	N.E. to N.W.	8					
„ 9	„ 4	4 p.m.	42	54	28·8	W. to N.W.	10					
„ 17	„ 14	3 a.m.	42	63	29·0	S.W. to N.W.	10	March 19th or 20th.	—	—	Did not reach our shores. There appears to have been a disturbance at a great distance off our north-western coasts on 20th, but caused no gale. *Useless.*	17th and 18th. South-easterly and Southerly gales in west.
	„ 14	4 „	42	65	29·0	E. to S.W.	9					
„ 18	„ 14	Noon	?43	57	29·0	S.W. to N.W.	11					
„ 22	„ 18	8 a.m.	46	47	29·1	N. to N.E.	10	March 22nd	—	—	No gale. Passed northward far outside our western coasts. *Useless.*	—
„ 31	„ 26	10 p.m.	43	51	29·0	S.W. to W.	9	March 31st	March 31st	—	Large and deep. *Useless. Too late.*	26th, 28th, and 30th.

Submitted—The following report on the forecasts for May 1886 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

MAY.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	23	46	35	68
"	b	35	31	33	
"	c	27	11	19	
"	d	15	12	13	
SCOTLAND, E.	a	23	42	33	69
"	b	50	23	36	
"	c	12	19	16	
"	d	15	16	15	
ENGLAND, N.E.	a	42	54	48	72
"	b	35	12	24	
"	c	12	7	9	
"	d	11	27	19	
ENGLAND, E.	a	46	46	46	73
"	b	31	23	27	
"	c	8	16	12	
"	d	15	15	15	
MIDLAND COS.	a	58	54	56	77
"	b	23	19	21	
"	c	8	15	12	
"	d	11	12	11	
ENGLAND, S.	a	65	35	50	75
"	b	12	38	25	
"	c	4	15	10	
"	d	19	12	15	
SCOTLAND, W.	a	31	31	31	66
"	b	46	23	35	
"	c	12	27	19	
"	d	11	19	15	
ENGLAND, N.W.	a	58	31	45	75
"	b	38	23	30	
"	c	4	31	18	
"	d	0	15	7	
ENGLAND, S.W.	a	50	46	48	83
"	b	35	35	35	
"	c	11	8	10	
"	d	4	11	7	
IRELAND, N.	a	35	46	41	75
"	b	42	27	34	
"	c	15	15	15	
"	d	8	12	10	
IRELAND, S.	a	23	42	33	77
"	b	50	39	44	
"	c	12	4	8	
"	d	15	15	15	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	37	60	49	85
"	b	48	30	36	
"	c	17	0	9	
"	d	3	10	6	
SCOTLAND, E.	a	47	50	49	81
"	b	37	27	32	
"	c	13	7	10	
"	d	3	16	9	
ENGLAND, N.E.	a	57	43	50	80
"	b	36	24	30	
"	c	7	13	10	
"	d	0	20	10	
ENGLAND, E.	a	61	37	49	80
"	b	32	30	31	
"	c	7	13	10	
"	d	0	20	10	
MIDLAND COS.	a	68	43	56	87
"	b	32	30	31	
"	c	0	10	5	
"	d	0	17	8	
ENGLAND, S.	a	59	31	45	80
"	b	31	38	35	
"	c	7	14	10	
"	d	3	17	10	
SCOTLAND, W.	a	31	33	32	69
"	b	38	37	37	
"	c	17	10	14	
"	d	14	20	17	
ENGLAND, N.W.	a	45	30	38	77
"	b	38	40	39	
"	c	10	17	13	
"	d	7	13	10	
ENGLAND, S.W.	a	46	45	46	86
"	b	43	38	40	
"	c	4	10	7	
"	d	7	7	7	
IRELAND, N.	a	31	53	42	78
"	b	45	27	36	
"	c	17	13	15	
"	d	7	7	7	
IRELAND, S.	a	38	43	41	77
"	b	35	37	36	
"	c	10	7	8	
"	d	17	13	15	

SUMMARY.

BRITISH ISLES	a	41	43	42	74
"	b	36	27	32	
"	c	12	15	13	
"	d	11	15	13	

BRITISH ISLES	a	47	43	45	80
"	b	37	32	35	
"	c	10	10	10	
"	d	6	15	10	

Professor Stokes submitted the following memorandum on cloud photography (Minutes, 1885, p. 100) :—

CLOUD PHOTOGRAPHS.

The Council have now obtained a series of cloud photographs taken with cameras at two stations at a distance apart of 800 yards. Each observation involves four photographs, one pair taken simultaneously at the two stations respectively, and another pair taken about a minute after the former. The object was to determine the height, direction of motion, and velocity of various clouds.

In the observation the cameras are set to correspond, so that the lines of collimation in taking the four photographs are in the same direction, save as to certain small corrections of the nature of index errors. A selection is made of cloud-points which can be identified, and these are marked on the four photographs. The co-ordinates of the marked points referred to vertical and horizontal lines shown on the photograph can be measured, when it becomes a question of calculation only to determine the position of a cloud point, both for the first and second moments of observation, and consequently to determine not only its height, but the direction and velocity of its motion. At either moment the photographs determine the two lines of sight for the cloud-point, as seen from the stations respectively. If the identification be correct, these lines ought to intersect, which would give a relation between the four observed quantities, namely, the altitudes and azimuths of the cloud-point as seen from the two stations; accordingly three of these observed quantities suffice for the determination, and then the fourth affords a verification.

The requisite formulæ for the reduction are readily obtained from spherical trigonometry. The calculation is perfectly straightforward, and there would be no difficulty about it if we had only a small number of cloud-points to reduce.

It is very desirable, however, to have numerous observations, and to determine, at least at first, a considerable number of cloud-points for each. The calculation, however, as above indicated, though straightforward, is by no means short; and the labour and consequent expense of making very numerous reductions in this manner would be almost prohibitive. Accordingly an endeavour has been made to simplify the process, and a method has been devised which promises to give the results with very little trouble, and at the same time very accurately.

It would be premature to describe this method at length until it shall have been actually put in practice. Suffice it to say that paper positives are taken from the glass negatives, and the cloud-points are marked on them. The four positives are laid in succession on a piece of paper on which a pair of cross-lines had previously been drawn, a correction being made for index errors by slightly shifting the positive from the position in which the cross-lines on it would be in a line with the cross-lines on the paper below. The places are then copied by pricking through. The lower paper now contains the record of the whole observation, cleared of index errors.

It is easy then to pass from the projection of the cloud-points on a plane parallel to the plates, to a projection on a horizontal plane in the following manner:—A wooden frame is prepared containing (1) a lens or combination of short focus with its axis horizontal; (2) a vertical frame, or board with a window, at a horizontal distance from the focus of the lens equal to the focal length of the objective of the camera; (3) a drawing board movable round a horizontal axis intersecting at right angles the axis of the instrument, and capable of being clamped at any desired angle to the vertical frame.

The drawing board is set at an angle to the vertical equal to the zenith distance of the line of collimation in the set of observations to be reduced, and the pricked paper is fastened by drawing pins to the vertical frame, the four arms of the cross having been previously marked by pricking through. A piece of paper having been pinned on to the drawing board, the sun's light is reflected into the lens, and the operator marks the centres of the spots of light corresponding to the various holes. This can be done with the utmost precision, if the pin or needle used for pricking has the proper diameter to give, as a result of diffraction, a very fine black centre in the middle of the illuminated patch.

When the four marked points corresponding to the four observations on any one cloud-point are joined, a quadrilateral is formed, two opposite sides of which, if there be no error of observation, will be parallel to each other and to the line joining the stations. If, moreover, the cloud be not moving up or down, but only in a horizontal plane, the sides above mentioned will be equal, and the quadrilateral will be a parallelogram. Two opposite sides represent the drift on the same scale on which the other two sides represent the base line of 800 yards, so that the magnitude and direction of motion are in a manner represented to the eye. Moreover, the height is given by the simple expression P cos $z_0 \div p$; where P is the product of the base and the horizontal distance from the focus of the lens to the drawing board, which accordingly is always the same, z_0 is the zenith distance of the line of collimation, and is therefore the same for all the cloud-points belonging to the same set, and p is the side of the parallelogram belonging to any particular cloud-point which is parallel to the base. The calculation is accordingly extremely easy; and, moreover, an inspection of the different figures shows at once the relative heights of the different cloud points, since the heights are inversely as the parallel sides of the corresponding parallelograms.

The photographs hold out the prospect of giving very good results. It is to be remembered that there is no object in extreme accuracy; what we want is rather numerous observations, so as to get a general insight into the movements of the air at different heights, and under different circumstances.

Read—A memorandum from Captain Toynbee reporting that since the last meeting eight logs had been received, seven of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Commr. L. S. Dawson, R.N., and Lieut. H. H. Douglas, R.N.	H.M.S. "Sylvia"	Jan. 18—May 21, 1886.	Gibraltar to Sierra Leone, and back.	—
Capt. G. Denham -	S.S. "Ocean King."	Sept. 21, 1885—May 22, 1886.	Two voyages to and from Quebec, one voyage to and from New Orleans.	1885, p. 46.
Capt. F. Marshall -	"Wiltshire" -	April 17, 1885—May 4, 1886.	London to Rio Janeiro, Chittagong, and home.	1884, p. 113.
Capt. M. Parry -	S.S. "Prydain"	Nov. 18, 1885—May 13, 1886.	To and from Savannah. To Mediterranean, Philadelphia, and home.	1885, p. 74.
Capt. H. Parsell -	S.S. "Adriatic"	Dec. 11, 1885—March 22, 1886.	Five voyages to and from New York.	1885, p. 88.
Capt. J. H. Price -	Barque "Viola"	May 2, 1885—May 25, 1886.	To Vancouver Island, Portland (Oregon), and home.	1883, p. 117.
Capt. A. S. Thomson, F.R.Met.Soc.	S.S. "Silvertown" and S.S. "Buccaneer."	Oct. 15, 1885—April 5, 1886.	To West Coast of Africa, Ascension, and home.	1885, p. 27.

Mr. Scott was instructed to present the Charts (O. 43) to Commander Dawson, O. 27 to Lieut. Douglas, and to convey the best thanks of the Council to the other observers.

Read—Letter 1164 from Mr. Gaster requesting permission to use the official charts and reports in the Office for the purpose of preparing a work "On the different types of Pressure Distribution over Western and Northern Europe, in their relation to Forecasts and Storm Warnings."—Permission was granted.

Reported—That Mr. F. C. Bayard, having obtained from the Office a copy of the Hourly Readings for 1877, had forwarded (Letter 1226) a copy of the Monthly Means of these Readings, for use in the Office.

Mr. Scott was instructed to express the best thanks of the Council to Mr. Bayard for his work.

He was also authorized to supply to Mr. Bayard a copy of the Hourly Readings for 1878.

Read—Letter 1271 from the Royal Meteorological Society, inquiring if the Council would allow 25*l.* towards the costs of their inspections, as in former years.—(Approved, P.C. 1272.)

Submitted—The following statements of work for May 1886:—

MARINE ROOM.

June 1, 1886.

Examined 15 new logs.

North Atlantic Weather Charts.

Progress made with the reduction of charts for January 1883, and preparing them for the lithographer.

Reduced charts to November 7, 1882, sent to the lithographer, and proofs of lithographed charts received to October 17, with the exception of two sheets.

All charts passed for press to October 11, with the exception of two sheets not yet received from the lithographer.

Generalized winds entered to end of June 1883.

A series of charts prepared for the Royal Society's *soirée*, showing the working process.

The female clerks engaged on eidograph and preparing charts for the lithographer.

General.

Discussion of Red Sea data for January and July; also testing results from observations received from the Dutch Meteorological Institute.

Copying observations to complete Office logs Nos. 6,000 and 6,398.

Indexing data in ocean 10° squares.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(To 31st May 1886.)

Monthly Weather Report, 1886:—

February and March; in proof

April; half done.

Weekly and Daily Weather Reports.—All published to date.

Quarterly Summary of Weekly Weather Report.—1st Quarter 1886—published.

Checking Daily Forecasts (3.30 p.m. and 8.30 p.m.).—Complete to date.

Checking of Storm Warning Signals, 1885.—Completed, and results handed in.

Calculation of Mean Aggregate Values for Accumulated Heat, Rainfall, and Bright Sunshine from beginning of year to end of each week—for the eight years 1878-85.—Completed for each district.

Report on the Prevalence of Gales on British Coasts for the 15 *years* 1871-85.—Summary nearly complete.

Preparation of Mean Monthly Atmospheric Pressure at 8 *a.m.*, for all Telegraphic Reporting Stations for five years 1881-85, and their incorporation with corresponding values for 10 years 1871-80.—Half done.

Report on certain proposed additions to and alterations in the telegrams received for use in the Daily Weather Report.—Completed.

Report on a Comparison of the Telegrams received at the Meteorological Office from the Chief Signal Officer, U.S., and the weather subsequently experienced on this side of the Atlantic.—Nearly completed.

The Easter holidays were taken during this month.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

June 1, 1886.

Observatory Returns.—The "Hourly Readings" for December 1883 completed and sent to press. The calculation of the monthly means for 1883 is now in hand.

Harmonic Analyser.—The analysis of the barograms has been completed to the end of 1873, and the curves for 1874 are now being dealt with. Copies have been made, for sending to press, of the monthly means, and of the results of their comparison with the calculated means. A good many experiments have been made with the analyser in connection with the "error of traverse." A good deal of time has been occupied in the preparation of a paper on the working of the machine.

Krakatoa Air-wave.—The report on this discussion is complete, and there now remains but one table to which a little has to be added. Trials have been made of the effect of reducing some of the plates, and the series of 15 charts has now to be reduced and combined, so as to bring them into five quarto plates; this will be at once commenced.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION ROOM.

SIR, June 1, 1886.

THE following is a report of the work done in this department during the past month, Mr. Aldridge being absent on vacation from the 15th ultimo.

EXAMINATIONS.

January 1884:—Two *barograms* and five *anemograms*.

February 1884:—Two *thermograms* and two *barograms*.

INVESTIGATIONS, &C.

Notes of errors to Aberdeen, Falmouth, Kew, and Valencia for January 1884, and report thereon to Council.

Investigations *re* Beckley's Rain Gauge; squall of the 13th January, 1886; on the respective merits of the waxed paper, and "A.G.B." processes of photography; *re* Aberdeen, Falmouth, and Valencia wet-bulb zero-line values; *re* Valencia rainfall, and report on the work of the room (see M.O. 1,099—1886).

MISCELLANEOUS.

The weekly examination, &c. of curves and documents.

I am, &c.

R. H. Scott, Esq., F.R.S. (Signed) T. E. ALLEN.

Secretary, Meteorological Council.

Reported—That the following cheques had been drawn during the month of May:—

1886.			£	s.	d.
May 1st.	For payment of weekly salaries		18	11	0
„ 5th.	Bank of England, sale of Stationery Office forms		10	0	4
„ „	H.M. Paymaster General. Barometer bought at Bombay		4	2	3
„ 8th.	For payment of weekly salaries		15	15	0
„ 15th.	Pall Mall Coal Company, coals		5	10	0
„ „	F. Vibert, instruments belonging to late Mr. Vibert		9	16	0
„ „	Royal Meteorological Society, observations		10	16	8
„ „	Anglo-American Telegraph Company, telegrams		1	5	0
„ „	For payment of weekly salaries		16	19	6
„ 19th.	H. Bond, repairing ceilings, &c.		49	17	0
„ 22nd.	For payment of weekly salaries		15	18	6
„ „	J. S. Harding, jun., petty cash		50	0	0
„ 29th.	For payment of weekly salaries		15	18	6
„ 31st.	R. H. Scott, secretary		66	13	4
„ „	J. S. Harding, junr.	"Office" Salaries	27	15	6
„ „	T. D. Bell	"Office" Salaries	15	8	4
„ „	J. Sheerman, salary, harmonic analysis		10	8	4
„ „	J. E. Cullum, salary, Valencia observatory		16	13	4
„ „	R. H. Curtis	Salaries (Discussion, &c. of Observations).	22	18	4
„ „	J. A. Curtis	Salaries (Discussion, &c. of Observations).	17	18	4
„ „	T. E. Allen	Salaries (Discussion, &c. of Observations).	16	13	4
„ „	C. H. Thompson	Salaries (Discussion, &c. of Observations).	12	1	8
„ „	S. Call	Salaries (Discussion, &c. of Observations).	11	5	0
„ „	E. G. Aldridge	Salaries (Discussion, &c. of Observations).	9	3	4
„ „	R. G. Canham	Salaries (Discussion, &c. of Observations).	7	1	8
„ „	A. H. Bell	Salaries (Discussion, &c. of Observations).	7	1	8
„ „	F. Gaster	Salaries (Preparation, &c. of Weather Reports).	25	15	7
„ „	F. J. Brodie	Salaries (Preparation, &c. of Weather Reports).	17	16	3
„ „	G. G. Francis	Salaries (Preparation, &c. of Weather Reports).	17	6	10
„ „	A. J. Rigby	Salaries (Preparation, &c. of Weather Reports).	16	17	6
„ „	R. Sargeant	Salaries (Preparation, &c. of Weather Reports).	11	14	4
„ „	A. R. Simkins	Salaries (Preparation, &c. of Weather Reports).	9	16	10
„ „	H. J. Stevens	Salaries (Preparation, &c. of Weather Reports).	8	15	0
„ „	Capt. H. Toynbee	Salaries (Discussion, &c. of Observations, and care of Instruments).	33	6	8
„ „	Nav.-Lt. C. W. Baillie, R.N.	Salaries (Discussion, &c. of Observations, and care of Instruments).	20	16	8
„ „	R. Strachan	Salaries (Discussion, &c. of Observations, and care of Instruments).	27	15	6
„ „	C. Harding	Salaries (Discussion, &c. of Observations, and care of Instruments).	22	18	4
„ „	H. Harries	Salaries (Discussion, &c. of Observations, and care of Instruments).	14	11	8
„ „	W. Allingham	Salaries (Discussion, &c. of Observations, and care of Instruments).	14	11	8
„ „	W. G. James	Salaries (Discussion, &c. of Observations, and care of Instruments).	10	16	8
„ „	F. T. Bullen	Salaries (Discussion, &c. of Observations, and care of Instruments).	9	3	4
„ „	R. F. Wallace	Salaries (Discussion, &c. of Observations, and care of Instruments).	8	6	8
„ „	J. A. Curtis	Preparing Barometer Readings for Col. Brooke.	1	10	0
„ „	R. G. Canham	Preparing Barometer Readings for Col. Brooke.	2	5	0
„ „	A. H. Bell	Preparing Barometer Readings for Col. Brooke.	2	9	6
„ „	C. A. Bracey	Preparing Barometer Readings for Col. Brooke.	1	5	0
„ „	F. Gaster, for payment of allowances for late evening and Sunday attendance		17	14	7
			£761	5	6

116, *Victoria Street, June* 21, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (June 2) were read and confirmed.

The draft Report of the Office for the year 1885–6 was reconsidered (Minutes, p. 22), and approved, and the Secretary was instructed to forward it to the Royal Society. (P.C. 1394.)

With reference to the subject of telegrams relating to the weather over the United States (Minutes, p. 27), Mr. Scott was instructed to inquire of Mons. Mascart as to his views as to the form of the despatches, and as to the amount he can supply towards defraying the cost of the service. (P.C. 1393.)

With reference to the subject of proposed increase in the amount of telegraphic reports received daily (Minutes, p. 26), Mr. Scott reported that, as for the despatches from Corunna and Lisbon, M. de Brito Capello had at once (Letter 1,364) announced his readiness to supply the information *gratis*, and that Sir James Anderson, on the part of the Eastern Telegraph Company (Letter 1,287), had expressed their readiness to transmit the messages from Lisbon to London free for 12 months. Mr. Scott stated that the service had already commenced. He was instructed to express to the M. Capello and to Sir James Anderson the thanks of the Council for their liberality in the matter. (P.C. 1386 and 1390.)

Mr. Scott was instructed to make arrangements for any changes in the system which would not involve additional expense.

The subject of the proposed printing of the returns from the stations of the Royal Engineers and the Army Medical Department (Minutes, pp. 2, 13, and 23) was taken into consideration, and Mr. Scott was authorized to print the returns, at the minimum of expense.

Read—A memorandum from Captain Toynbee reporting that since the last meeting three logs had been received, one of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. C. F. Cooke, F.R.Met.Soc.	"Melbourne" -	Aug. 20, 1885—May 29, 1886.	Melbourne and home -	1884, p. 113.

Mr. Scott was instructed to convey the best thanks of the Council to Captain Cooke.

It was resolved that the North Atlantic Charts should be issued in a portfolio, and Mr. Scott was instructed to procure and submit a specimen.

Reported—That the Tyne Improvement Commission (Letter 1,358, Minutes, p. 1) had stated that the site in Dockwray Square was available for the anemometer formerly at Seaham Harbour. Mr. Scott was instructed to inform the Commission that the inspector, Mr. Ley, who would shortly visit North Shields, would be requested to make final arrangements. (P.C. 1392.)

Submitted—The following Statement respecting the Records for February 1884, received from the Self-recording Observatories (see Minutes, 21st December 1868 and 20th November 1876) :—

	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action	Good	Good	Indifft.	Indifft.	Good	Good	Indifft.	Indifft.	Good	Good
Records deficient, due to stoppage of clock	0	0	15 hrs.	15 hrs.	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0	0	0	0
Orientation verified	23rd	—	—	—	5th	—	12th	—	7th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	0	0	9	2	1	2	0	2	0
Result of 40 *Remeasurements* :—										
Greatest difference	1·0	1·0	0·0	1·0	0·0	1·0	1·0	1·0	0·0	2·0
Mean difference irrespective of sign	0·0	0·4	0·0	0·3	0·0	0·4	0·0	0·3	0·0	0·5
Residual difference (—Meteorological Office)	0·0	+0·1	0·0	0·0	0·0	0·0	0·0	0·0	0·0	0·0

	Aberdeen.	Armagh.	Falmouth.	Kew.	Valencia.
RAIN GAUGE:—					
Action	Good.	Good.	Good.	Good.	Good.
Records deficient, due to stoppage of clock	0	0	0	0	0
„ „ other causes	0	0	0	*5 hrs.	0
Errors in tabulation	0	4	2	0	1

	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH :—				
Action	Good.	Good.	Good.	Good.
Photography	Do.	Bad.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	0
„ „ failure of light	0	0	0	0
„ „ other causes	0	{ †8 hrs. ‡33 hrs. }	{ ‖4 hrs. §1 hr. }	0
No of errors discovered—				
In entry of standard	0	2	3	0
„ calculating residual correction	1	0	0	0
„ applying residual correction	0	0	0	0
„ subtraction in subsidiary tables	0	0	0	0
„ tabulation by subsidiaries	0	0	0	0
„ „ irregular differences	0	0	0	1
Result of 40 *Remeasurements* :—				
Greatest difference	·005	·011	·006	·010
Mean difference irrespective of sign	·002	·002	·003	·003
Residual difference (—Meteorological Office)	·000	+·001	·000	+·001
Mean monthly difference between simultaneous barograph and barometer readings	·001	·002	·003	·002

	Aberdeen.		Falmouth.		Kew.		Valencia.	
THERMOGRAPH :—								
Action	Good.		Good.		Good.		Good.	
Photography	Do.		Do.		Do.		Do.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	0	0	1
„ „ imperfectly moistened bulbs	—	0	—	0	—	0	—	0
„ „ partially frozen bulbs	—	32	—	0	—	8	—	0
„ „ other causes	0	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	0	0	0	0	0	0	0
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	0	0	0	0	1	0	0	0
„ detected under glass scale	0	0	0	0	0	0	0	0
Result of 40 *Remeasurements* :—								
Greatest difference	0·3	0·2	0·3	0·2	0·2	0·2	0·3	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·0
Residual difference (—Meteorological Office)	+0·1	0·0	0·0	0·0	0·0	−0·1	−0·1	0·0
Mean monthly difference between simultaneous thermograph and thermometer readings	0·1	0·2	0·1	0·1	0·2	0·1	0·1	0·1
No. of errors in maxima and minima	1	—	0	—	1	—	1	—

* Conducting experiments with discharging apparatus.
† Photographic imperfections.
‡ Carelessness of assistant.
‖ Shutter stopped clock.
§ Strengthening cylinder-spring.

116, *Victoria Street, July* 14, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (June 21) were read and confirmed.

With reference to the subject of the proposed daily telegrams from Washington (Minutes, p. 39), Mr. Scott reported that on the 25th ultimo he had received, in reply to his letter (P.C. 1393), a letter (M.O. 1449) from M. Mascart, enclosing a draft scheme for the telegrams, and stating that the cost of the service was estimated roughly at 144*l.* (3,600 francs) annually.

He had at once, by the Chairman's instructions, forwarded the draft scheme to Washington, with the following letter:—

(M.O. 1449.) Meteorological Office, June 26, 1886.

MY DEAR SIR,

THIS Office has been in correspondence with Professor Mascart of Paris on the subject of carrying out some scheme of daily telegrams from the United States similar to that proposed by M. Teisserenc de Bort at Paris in September last.

M. Mascart estimates the cost of such a scheme as the enclosed at 3,600 francs *per annum*, and I am instructed to ask if you think such an estimate sufficient, and if your Office would be prepared to undertake the compilation and transmission of daily telegrams of such a character as those proposed.

I am to ask you to be so kind as to telegraph to me at once your replies to the above questions. You can explain your views at length by letter, but the Council meet again on the 14th.

You will, I hope, understand that the Council have as yet taken no action on the matter, or decided whether or not they will entertain the proposal, so that no steps should be taken by your Office until you have received further communications.

We shall perfectly understand your reply if it is as follows:—

1. Telegraphic report Yes, without modification.
2. Do. do. with modification.
3. Do. do. No.

Yours, &c.

General Hazen. (Signed) ROBERT H. SCOTT.

On the 9th instant the following reply had been received from General Hazen:—

"Telegraphic report Yes, without modification."

In the meantime M. Mascart had paid a visit to London, and on the 7th instant had had an interview, at the Office, with the Chairman and Mr. Darwin, at which he had explained his views more fully than had been the case in the previous correspondence.

The Council resolved to assent to the proposed measures at a cost not exceeding 100*l.*, which is estimated to cover one half of the charges for one year.

Reported that Dr. Neumayer, on the part of the Deutsche Seewarte, had requested (Letter 1544) that for two months copies of all telegrams from the United States containing weather reports from ships' logs (Minutes, 1885, p. 1) should be forwarded to Hamburg.

With reference to the proposed increase in the number of telegraphic reports received daily Mr. Scott reported:—

1. That M. Capello (Letter 1528) had applied for a daily 6 p.m. report from Valencia, and that Sir James Anderson had kindly consented to forward it gratis for one year (Letter 1545). The service had accordingly been organised from the 13th instant.

2. That arrangements had been concluded with M. Mascart for the changes in the French service, as suggested (Minutes, p. 26). The change to take place August 1.
3. That the cost of the proposed reports from Germany was estimated at about 123*l.* per annum, if the reports from Dantzig and Breslau were not required (Letter 1379).

Mr. Scott was authorised to arrange for the receipt of the reports for one year, excluding the two last-named stations.

The subject of the electric anemometer proposed for Valencia was taken into consideration (Minutes, 1885, p. 102).

The following correspondence was submitted:—

(M.O. 1095.) Kew Observatory, Richmond, Surrey,
May 8, 1886.

DEAR MR. SCOTT,

IN reply to yours (M.O. 227, 1884) of the 6th instant, I have to state as follows:—

Having on February 11th received permission from the Meteorological Council (Letter M.O. 316) to send the electrical anemograph to the General Post Office for the nickel plating of the contacts, &c. to avoid rust, in accordance with the offer made by Mr. Kempe, as communicated by me in letter of February 3rd, the instrument was dismounted and duly forwarded.

Mr. Kempe returned it to the Observatory in perfect order, and having re-erected it on the Experimental House in the same position which it occupied previously, it was started on March 26th. Since that date daily curves have been obtained regularly from it, which have been compared with those afforded by the Observatory anemogrnph, and it is found that the action of the instrument has continued perfectly satisfactory both as regards direction and velocity. The batteries have required no attention whatever during the six weeks it has now been running.

The battery for working the velocity gear is still in the condition it was when originally started in March 1885, it having only received slight additions of sal ammoniac on two or three occasions. The direction battery was entirely re-charged on re-starting the instrument, it having run down during the stoppage by the snowstorm.

With regard to its future disposal I would beg to suggest that before erecting it for permanent use it will be necessary to repair or renew the cups and fans which are very much worn from many years service.

I also submit herewith the curves obtained for March 26th to April 1st, and April 28th and 29th (these being the registers of the highest winds we have experienced during its last trial). In comparing these curves with the Kew anemograms, the difference of exposure and altitude of the two instruments must be taken into consideration.

Yours, &c.
(Signed) G. M. WHIPPLE,
Superintendent.

(M.O. 227.)

DEAR SIR, Meteorological Office, May 10, 1886.

WITH reference to your letter of the 16th January 1884 (addressed to Mr. Galton), I beg to inform you that the electrical anemometer has now been in action at Kew Observatory for six weeks, and is reported to have worked quite satisfactorily. I have now to request that you will be good enough to let me know what "terms could be arranged with the Post Office for its final erection and maintenance" at Valencia.

Yours, &c.
(Signed) ROBERT H. SCOTT,
Secretary.

W. H. Preece, Esq., C.E., F.R.S.,
Central Telegraph Office, E.C.

(M.O. 1440.) General Post Office, London,
June 23, 1886.

SIR,

WITH reference to your letter of the 10th May last, I beg leave to inform you that the Post Office is prepared—subject to wayleave being obtained for the route upon which these terms are based—to provide the electrical apparatus in connection with the anemometer at Kilbeg Hill, and to erect and maintain two line wires from thence to the Meteorological Office at Valencia, a distance estimated at one mile, for a rental of 50*l.* per annum, under an agreement for five years in the usual form. The charge includes the maintenance of the electrical apparatus and the wire; the anemometer to be maintained by the Meteorological Office.

I am, &c.
(Signed) C. H. B. PATEY.

Robert H. Scott, Esq., M.A., F.R.S.,
Meteorological Office.

Professor Stokes submitted the apparatus which he had devised for measuring cloud photographs (Minutes, p. 35). Mr. Scott was instructed to forward the apparatus to Kew.

Submitted—The following Reports on the forecasts for the month of June, 1886.

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

JUNE.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	50	65	58	86
,,	b	38	19	28	
,,	c	8	8	8	
,,	d	4	8	6	
Scotland, E.	a	46	65	56	88
,,	b	46	19	32	
,,	c	4	12	8	
,,	d	4	4	4	
England, N.E.	a	65	50	58	85
,,	b	23	31	27	
,,	c	8	4	6	
,,	d	4	15	9	
England, E.	a	69	35	52	79
,,	b	23	31	27	
,,	c	8	11	10	
,,	d	0	23	11	
Midland Cos.	a	65	39	52	83
,,	b	23	38	31	
,,	c	12	8	10	
,,	d	0	15	7	
England, S.	a	65	46	56	77
,,	b	23	19	21	
,,	c	4	16	10	
,,	d	8	19	13	
Scotland, W.	a	54	54	54	91
,,	b	38	35	37	
,,	c	4	7	5	
,,	d	4	4	4	
England, N.W.	a	77	54	66	87
,,	b	15	27	21	
,,	c	8	19	13	
,,	d	0	0	0	
England, S.W.	a	73	62	68	89
,,	b	27	15	21	
,,	c	0	8	4	
,,	d	0	15	7	
Ireland, N.	a	69	46	58	85
,,	b	19	35	27	
,,	c	12	8	10	
,,	d	0	11	5	
Ireland, S.	a	54	69	62	85
,,	b	35	12	23	
,,	c	11	12	12	
,,	d	0	7	3	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	63	40	52	82
,,	b	27	33	30	
,,	c	7	17	12	
,,	d	3	10	6	
Scotland, E.	a	64	64	64	87
,,	b	33	13	23	
,,	c	0	10	5	
,,	d	3	13	8	
England, N.E.	a	70	50	60	87
,,	b	27	27	27	
,,	c	3	7	5	
,,	d	0	16	8	
England, E.	a	64	37	51	84
,,	b	30	37	33	
,,	c	3	13	8	
,,	d	3	13	8	
Midland Cos.	a	77	47	62	91
,,	b	20	37	29	
,,	c	0	6	3	
,,	d	3	10	6	
England, S.	a	60	47	54	84
,,	b	37	23	30	
,,	c	0	13	6	
,,	d	3	17	10	
Scotland, W.	a	54	43	49	84
,,	b	33	37	35	
,,	c	10	3	6	
,,	d	3	17	10	
England, N.W.	a	73	43	58	87
,,	b	27	30	29	
,,	c	0	10	5	
,,	d	0	17	8	
England, S.W.	a	67	50	59	84
,,	b	27	24	25	
,,	c	3	3	3	
,,	d	3	23	13	
Ireland, N.	a	63	50	57	85
,,	b	30	27	28	
,,	c	7	7	7	
,,	d	0	16	8	
Ireland, S.	a	63	54	59	85
,,	b	30	23	26	
,,	c	7	13	10	
,,	d	0	10	5	

SUMMARY.

British Isles	a	63	53	58	85
,,	b	28	26	27	
,,	c	7	10	9	
,,	d	2	11	6	
British Isles	a	65	48	57	85
,,	b	29	28	28	
,,	c	4	9	7	
,,	d	2	15	8	

Submitted—The following Statement respecting the records for March 1884, received from the Self-recording Observatories (see Minutes, 21st December 1868 and 20th November 1876):—

——	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action	Good	Good	Indifft.	Indifft.	Good	Good	Good	Good	Good	Good
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0	0	0	0
Orientation verified	28th	—	—	—	6th	—	5th	—	7th	—
No. of errors discovered by subsidiaries	0	0	0	0	0	0	0	0	0	0
„ „ irregular differences	0	0	3	1	6	0	10	0	0	0
Result of 40 *Remeasurements*:—										
Greatest difference	1·0	1·0	1·0	2·0	2·0	1·0	1·0	1·0	1·0	3·0
Mean difference irrespective of sign	0·1	0·3	0·1	0·5	0·1	0·4	0·1	0·2	0·1	0·9
Residual difference (—Meteorological Office)	−0·1	+0·1	−0·1	0·0	+0·1	+0·1	+0·1	+0·1	−0·1	−0·2
RAIN GAUGE:—										
Action	Good		Good		Indifferent		Good		Good	
Records deficient, due to stoppage of clock	0		0		0		0		0	
„ „ other causes	0		0		0		0		0	
Errors of tabulation	0		1		2		0		0	

——	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH:—				
Action	Good	Good	Good	Good
Photography	Do.	Bad	Do.	Fair
Records deficient, due to stoppage of clock	0	0	0	0
„ „ failure of light	0	0	1	0
„ „ other causes	0	0	0	0
No. of errors discovered—				
In entry of standard	0	1	0	0
„ calculating residual correction	0	0	0	1
„ applying residual correction	0	0	0	0
„ subtraction in subsidiary tables	—	—	1	—
„ tabulation by subsidiaries	0	0	0	0
„ „ irregular differences	0	1	1	37
Result of 40 *Remeasurements*:—				
Greatest difference	·008	·010	·005	·011
Mean difference irrespective of sign	·002	·003	·002	·004
Residual difference (—Meteorological Office)	+·001	·000	·000	+·003
Mean monthly difference between simultaneous barograph and barometer readings	·002	·002	·002	·001

THERMOGRAPH:—	Aberdeen.		Falmouth.		Kew.		Valencia.	
Action	Good		Good		Good		Good	
Photography	Do.		Fair		Do.		Bad	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	3 hrs.	3 hrs.
„ „ failure of light	0	0	0	0	1 hr.	1 hr.	0	0
„ „ imperfectly moistened bulbs	—	0	—	0	—	0	—	1 hr.
„ „ partially frozen bulbs	—	4	—	0	—	6	—	5 hrs.
„ „ other causes	0	0	0	0	0	0	0	0
No. of errors discovered in entry of standard	0	0	2	3	0	0	0	0
„ „ by subsidiary measurements	0	0	0	0	0	0	0	0
„ „ of subtraction in do. tables	—	—	—	—	1	0	0	0
„ detected under glass scale	0	0	0	0	0	0	0	0
„ in maxima and minima	0	—	2	—	2	—	2	—
Result of 40 *Remeasurements*:—								
Greatest difference	0·2	0·2	0·2	0·2	0·2	0·2	0·4	0·3
Mean differsnce irrespective of eign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	+0·1	0·0	0·0	0·0	−0·1	−0·1	−0·1	0·0
Mean monthly difference between simultaneous thermograph and thermometer readings	0·1	0·2	0·1	0·1	0·2	0·1	0·1	0·1

Submitted—The report on the relative prevalence of gales on the coasts of the United Kingdom [1871–85] (Minutes, 1885, p. 62). Mr. Scott was instructed to forward it to the Hydrographer (P.C. 1554).

Submitted—The following report :—

SIR, Meteorological Office, June 30, 1886.

I HAVE the honour to report, for the information of the Council, on the work which has been done for the quarter ending 30th June 1886.

The current chart of South Pacific Ocean for the month of February, referred to in my last report (p. 2), has been completed as far as the observations contained in the Office logs are concerned, and the chart of North Pacific Ocean for the same month will also be finished by the end of July.

I was absent for 15 days summer vacation during the quarter, and since the 7th June I have discharged the duties of Marine Superintendent, which have occupied the whole of my time.

I am, &c.
(Signed) C. W. BAILLIE,
Navg. Lieut. R.N.

The Secretary, Meteorological Council.

Submitted—The specimen portfolio for the Atlantic charts (Minutes, p. 39). Some modifications were suggested.

Read—An application from Mr. C. Harding (Letter 1577) for permission to attend certain anemometrical experiments proposed to be carried out by a Committee of the Royal Meteorological Society.

The Council resolved to grant extra leave for a short period, but the expenses to be borne by Mr. Harding.

Read—Letter 1501, from Mr. E. G. Aldridge, resigning his appointment on the ground of ill health. To take effect from the 31st instant.

Reported—That the following instruments were required, and their purchase was authorised :—

"A" Account.

		£	s.	d.
150 thermometers	cost	52	10	0
25 maximum ditto 25 minimum ditto		33	15	0

"B T" Account.

		£	s.	d.
150 thermometers	cost	52	10	0

July 14th, 1886. (Signed) R. STRACHAN.

Submitted—The following statements of work for June 1886 :—

MARINE ROOM.

July 12, 1886.

Examined 14 new logs.

North Atlantic Weather Charts.

Completed the reduction by eidograph of the charts for January 1883, and the reduction of February advanced.

Forwarded to the lithographer reduced charts to November 25, 1882. Proofs received, and with one exception, passed for press to November 4.

Obtaining the lowest barometer values near the centres of disturbances during March and April, 1883.

First drawing of isobars and isotherms for August 1883, completed.

The female clerks employed on eidographing and preparing charts for reproduction by lithography.

General.

Discussion of Red Sea data for all months.

Copying various observations from Rough Book into log 6,456 ; and from log 6,460, and letter 1,310.

Indexing data in ocean 10° squares.

The Marine Superintendent. (Signed) CHAS HARDING.

Forwarded for the information of the Council.

(Signed) C. W. BAILLIE.

Telegraphic (Forecast and Storm Warning) Branch.

(To 30th June 1886.)

Monthly Weather Report, 1886 :—

February. Revised and sent back to printer.

March. In proof.

April. In proof.

May. Well in hand.

Weekly and Daily Weather Reports.—All published to date.

Checking Daily (3.30 p.m. and 8.30 p.m.) *Forecasts*—All done to date.

Hay Harvest Forecasts, 1886.—Organised, and issue commenced.

Report on a Comparison of the Atlantic Storm Telegrams received during the six months October 1885 to March 1886, with the weather experienced.—Completed.

Report on Prevalence of Gales on British Coasts.—Nearly complete.

Preparation of Monthly Means of Pressure at Telegraphic Reporting Stations for 15 years 1871–85.—Completed, except in one or two cases, for which part of this information is still wanting.

Some time has been spent also in making the necessary arrangements for the receipt of new telegrams from abroad.

(Signed) Fredc. Gaster.

July 1, 1886.

Pantagraph Room.

Observatory Returns.—The calculation of the monthly and other means for 1883 completed, and Appendices I. and Ia. "Hourly Readings, 1883" prepared and sent to press. Proof of "Hourly Readings" revised to the beginning of December 1883. The five-day and other means for January 1884 are now in hand.

Quarterly Weather Report.—The whole of the letter-press and tables of Part I., 1878, with the exception of the tables of cyclonic and anticyclonic systems is ready for press. The plates are also ready, except the small charts showing tracks of depressions. The chart plates for Part II. are in hand, but not far advanced.

Harmonic Analyser.—The analysis of the barograms for 1874 is in hand, and about three-fifths of the curves for the year have been passed through the machine. All the temperature results for the 12 years 1871–82 have been copied and sent to press.

Krakatoa Air Wave.—Reduced copies of 15 charts, and of other plate s have been made, and the remaining table completed. This work is now finished.

Miscellaneous.—A zinc plate engraved in April has been added to and altered. Notes on errors in position, &c. of sunshine recorders have been prepared for inspectors. Mr. Call has been absent on vacation about two weeks.

(Signed) R. H. Curtis.

R. H. Scott, Esq., F.R.S.

Examination Room.

Sir, July 1, 1886.

The following is a report of the work done in this department during the month of June :—

Examinations.

February (1884).—One *thermogram*
One *barogram.*
Five *anemograms.*

March (1884).—Three *thermograms.*
Three *barograms.*

Reports, Investigations, &c.

Notes of Errors to Aberdeen, Falmouth, Kew, and Valencia, for February, 1884, and *report* thereon to Council.

Re Falmouth rainfall, 1885, for Mr. Symons.

Miscellaneous.

The weekly examination of curves and documents.

Mr. Aldridge's failing sight, together with his and my absence on 3 and 7½ days respectively, have somewhat interfered with the progress of the work.

I am, &c.
(Signed) T. E Allen.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

Submitted—The following statement of accounts for the quarter ending 30th June 1886:—

Income.	£ s. d.	£ s. d.
Balance from year 1885–86		1,555 7 11
Proportion of Vote		3,825 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	1 5 11	
(2.) Special researches	2 1 8	
		3 7 7
Supply of Weather Information:		
D.W. Charts and Forecasts	58 16 4	
6 p.m. Charts	6 5 0	
Information for Press Agencies, &c.	21 9 8	
Telegrams	89 13 8	
Miscellaneous data	4 11 6	
		180 16 2
Sale of Instruments, &c.:		
Mercantile Marine account		9 18 10
Commission charged on work done for Colonies, &c.		5 13 5
		£5,580 3 11

Expenditure.	£ s. d.	£ s. d.
Administration:		
Payment of Council	250 0 0	
Secretary	200 0 0	
Salaries and wages	198 3 0	
Rent, fuel, and lighting	175 14 3	
Furniture and fittings	102 7 6	
Incidental and contingent expenses	78 15 6	
Expenses incidental to International Meteorological Congress	10 15 6	
Pensions	10 14 1	
		1,026 9 10
Special Researches		127 15 5
Land Meteorology:		
Observatories and stations	477 16 5	
Discussion and reduction of observations	341 2 0	
		818 18 5
Weather Information and Forecasts:		
Telegraphic reports and storm warnings	581 7 11	
Preparation and issue of reports and forecasts	409 9 7	
		990 17 6
Inspections:		
Salaries and travelling		130 0 0
Ocean Meteorology:		
Discussion and reduction of observations	463 1 6	
Expenses incidental to the supply of instruments:		
Proportion for care and issue of instruments	50 0 0	
Royal Navy	125 19 3	
Mercantile Marine	113 4 0	
Distant island and coast stations	4 8 0	
		756 12 9
Balance		1,729 10 0
		£5,580 3 11

Liabilities.	£ s. d.
To Council	250 0 0
„ contracts or work uncompleted	193 0 0
„ Post Office (partly estimated)	349 6 1
„ sundry creditors	430 13 3
„ balance	1,729 10 0
	£2,952 9 4

Assets.	£ s. d.
By cash at Bank	2,377 4 9
„ „ at Office	68 1 8
„ „ at Valencia	50 0 0
„ sundry debtors	132 2 11
„ H.M. Exchequer	325 0 0
	£2,952 9 4

Read—A memorandum from Captain Toynbee reporting that since the last meeting 16 logs had been received, 10 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. A. W. Adamson. Log kept by H. M. Lambert, R.N.R.	S.S. "Brindisi"	March 24—June 23, 1886.	India and home, viâ Suez	1885, p. 120.
Capt. B. J. Barlow, R.N.R. Log kept by E. J. Evans.	S.S. "Tainui"	March 27—July 7, 1886.	New Zealand and home	1885, p. 120.
Capt. E. J. Blake	"Tilkhurst"	June 11, 1885—June 6, 1886.	Singapore, and home from Calcutta.	1885, p. 3.
Capt. J. Davies	S.S. "Flaxman"	Nov. 28, 1885—June 13, 1886.	River Plate and home, two voyages.	1885, p. 83.
Capt. G. O. Hayward	S.S. "Dunrobin Castle."	March 6—June 21, 1886.	Cape Ports, Mauritius, and home.	1885, p. 103.
Capt. W. N. Lailey	S.S. "Boyne"	Dec. 25, 1885—July 1, 1886.	Madras, Akyab, and home, viâ Suez.	1885, p. 88.
Capt. J. Metcalfe	S.S. "Oceanic"	Feb. 3, 1885—March 17, 1886.	San Francisco, Hong Kong, and Yokohama, five voyages.	1885, p. 47.
Capt. J. C. Prout	"Cape St. Vincent."	Oct. 3, 1885—June 22, 1886.	Singapore, Java, and home.	1885, p. 47.
Capt. C. H. Renout and Capt. H. W. Gray.	"Pleione"	Sept. 17, 1885—June 21, 1886.	Wellington, and home	1885, p. 10.
Capt. Alexander Ross	"Berbice"	Aug. 25, 1885—June 14, 1886.	Buenos Ayres, Java, and home.	1882, p. 42.

Mr. Scott was instructed to present the Charts (O. 27) to Captain Gray, and to convey the best thanks of the Council to the other observers.

Reported—That the cash accounts for the six months ended the 31st March 1886 had been audited by the Chairman and Professor Darwin, and had been sent to the Treasury for the Audit Office. The receipts for the six months, exclusive of a balance of 2,191*l.* 5*s.* 7*d.* on the 1st October 1885, amounted to 8,810*l.* 4*s.* 10*d.* The payments amounted to 8,736*l.* 9*s.* 9*d.*, leaving a balance of 2,265*l.* 0*s.* 8*d.* in hand and at the Bank on the 1st April last.

Reported—That the following cheques had been drawn during the month of June:—

1886.		£	*s.*	*d.*
June 2nd.	J. S. Harding, translation of Report of International Meteorological Committee	8	12	0
„ „	T. D. Bell, copying ditto	2	3	6
„ „	R. W. Munro, repairing anemometer	38	5	0
„ „	Postmaster General, telegrams	113	5	1
„ 5th.	For weekly salaries	15	18	6
„ 12th.	T. E. Allen, tabulating Falmouth observations	5	18	6
„ „	Kew Committee, commissions account	16	13	6
„ „	For weekly salaries	15	18	6
„ „	„ „	15	18	6
„ 22nd.	Royal Meteorological Society, inspections	25	0	0
„ „	Anglo-American Telegraph Co., telegrams	1	19	6
„ „	Postmaster General, telegrams	188	14	0
„ „	L. P. Casella, commissions account	9	0	0
„ „	For weekly salaries	15	18	6
„ „	R. H. Scott, Secretary	66	13	4
„ „	J. S. Harding, junr. } "Office salaries"	27	15	6
„ „	T. D. Bell } "Office salaries"	15	8	4
„ „	J. Sheerman, salary (harmonic analysis)	10	8	4
„ „	J. E. Cullum „ (Valencia observatory)	16	13	4
	Carried forward	£610	3	11

1886.			£	s.	d.	£	s.	d.
		Brought forward -				610	3	11
June 22nd.	R. H. Curtis -	Salaries (discussion, &c. of observations).				22	18	4
,, ,,	J. A. Curtis -					17	18	4
,, ,,	T. E. Allen -					16	13	4
,, ,,	C. H. Thompson -					12	1	8
,, ,,	S. Call - -					11	5	0
,, ,,	E. G. Aldridge -					9	3	4
,, ,,	R. G. Canham -					7	1	8
,, ,,	A. H. Bell -					7	1	8
,, ,,	F. Gaster -	Salaries (preparation, &c. of Weather Reports).				25	15	7
,, ,,	F. J. Brodie -					17	16	3
,, ,,	G. G. Francis -					17	6	10
,, ,,	A. J. Rigby -					16	17	6
,, ,,	R. Sargeant -					11	14	4
,, ,,	A. R. Simpkins -					9	16	10
,, ,,	H. J. Stevens -					8	15	0
,, ,,	Capt. H. Toynbee,	Salaries (discussion, &c. of observations and care of instruments).				33	6	8
,, ,,	Nav. Lieut C. W. Baillie, R.N. -					20	16	8
,, ,,	R. Strachan -					27	15	6
,, ,,	C. Harding -					22	18	4
,, ,,	H. Harries -					14	11	8
,, ,,	W. Allingham -					14	11	8
,, ,,	W. G. James -					10	16	8
,, ,,	F. T. Bullen -					9	3	4
,, ,,	R. F. Wallace -					8	6	8
,, 30th.	G. J. Mayhew, rent - - - -				-	158	15	0
,, ,,	J. S. Harding, senr., pension (Minutes, 1882, p. 43)				-	10	14	1
,, ,,	W. Thomas, care of Scilly anemometer -		1	13	0			
,, ,,	,, Meteorological reports -		4	18	2			
						6	11	2
,, ,,	H. Williams, care of bridled anemometer -		2	10	9			
,, ,,	,, ,, Robinson's ,, -		3	6	3			
						5	17	0
,, ,,	C. Niven, Aberdeen Observatory - -		69	10	3			
,, ,,	J. L. E. Dreyer, Armagh Observatory -		14	6	4			
,, ,,	W. L. Fox, Falmouth ,, -		63	0	0			
,, ,,	R. Grant, Glasgow ,, -		18	3	6			
,, ,,	Kew Committee, allowance - -		100	0	0			
,, ,,	W. I. Fortescue, Orkney - - -		2	10	0			
,, ,,	S. J. Perry, Stonyhurst - - -		13	14	3			
,, ,,	J. E. Cullum, Valencia - - -		50	17	10			
						332	2	2
,, ,,	G. T. Watson, care of Yarmouth anemometer		3	19	0			
,, ,,	,, Meteorological reports -		4	5	6			
						8	4	6
,, ,,	J. O'Driscoll, rent at Valencia - -		-		-	25	0	6
,, ,,	H. Todd, Cambridge - - -		4	11	0			
,, ,,	H. Mohn, Christiania - - -		5	10	0			
,, ,,	P. Curnow, Dungeness - - -		4	11	7			
,, ,,	W. Edmonds ,, - - -		2	12	0			
,, ,,	W. Brand, Dunrossness - - -		3	18	3			
,, ,,	W. H. Bunce, Hawes Junction - -		1	19	9			
,, ,,	S. Richards, Holyhead - - -		4	2	0			
,, ,,	G. G. Appleton, Hurst Castle - -		3	18	6			
,, ,,	J. Fisher, Jersey - - - -		4	18	6			
,, ,,	F. Gaster, London - - - -		3	18	0			
,, ,,	W. Berridge, Loughborough - -		3	5	8			
,, ,,	Lloyds', for Malin Head - - -		3	5	0			
,, ,,	K. Kerr, Mullaghmore - - -		5	5	0			
		Carried forward	£51	15	3	1,532	1	2

			£	s.	d.	£	s.	d.
1886.		Brought forward -	51	15	3	1,532	1	2
June 30th.	A. Penny, Nairn - - - -		4	4	6			
,, ,,	W. Wickham, Oxford - - -		3	12	6			
,, ,,	B. Budds, Parsonstown - - -		3	7	6			
,, ,,	J. John, Prawle Point - - -		3	5	0			
,, ,,	S. Blake, St. Ann's Head - - -		3	6	6			
,, ,,	J. B. Smith, Spurn Head - - -		3	5	4			
,, ,,	D. Macdonald, Stornoway - - -		5	12	8			
,, ,,	J. Sinclair, Wick - - - -		3	5	0			
,, ,,	A. Guy, York - - - -		3	18	0			
						85	12	3
,, ,,	W. C. Ley, o/a inspections - - -		-		-	30	0	0
,, ,,	L. Allen, Dundee agent - - -		10	6	6			
,, ,,	D. McGregor & Co., Glasgow agents -		13	14	2			
,, ,,	Z. Scaping, Hull agent - -		1	7	6			
,, ,,	J. Gill, Liverpool ,, - - -		5	11	11			
,, ,,	C. H. Permain, Southampton agent -		1	0	3			
,, ,,	J. Fowler, Cardiff agent - - -		8	15	9			
						40	16	1
,, ,,	P. Adie, repairing "A" barometers -		4	4	8			
,, ,,	,, "B T" barometers and repairs -		50	3	2			
						54	7	10
,, ,,	R. Strachan, Meteorological registers -		-		-	4	7	6
,, ,,	Kew Committee, verification of "A" instruments		7	10	0			
,, ,,	,, ,, "B T" ,,		6	0	0			
,, ,,	,, ,, "C" ,,		2	14	0			
						16	4	0
,, ,,	F. Gaster, for payment of allowances for late evening and Sunday attendance - - - - -					15	8	1
,, ,,	J. S. Harding, jun., petty cash - - - -					30	0	0
						£1,808	16	11

116, *Victoria Street, October* 22, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	MR. STONE.
MR. GALTON.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (July 14) were read and confirmed.

Reported—That the following replies had been received to the circular (Minutes p. 23), inviting opinions as to the advantage of reading barometers to 0·001 inch :—

(M.O. 1418.)

DEAR SIR, Royal Meteorological Society, June 18, 1886

THE Council have considered your letter of May 19th, stating that the Meteorological Council have it in contemplation to abandon the reading of barometers to 0·001 inch, and to instruct their observers to read to 0·01 inch only.

I have to inform you that the Council of this Society are of opinion that the reading of barometers to the third place of decimals is unnecessary.

Yours, &c.
(Signed) WILLIAM MARRIOTT,
Assistant Secretary.

R. H. Scott, Esq., F.R.S.

(M.O. 1493.) Signal Office, War Department,
DEAR SIR, Washington City, June 18, 1886.

IN reply to your letter of the 19th ultimo, relative to the contemplated abandonment in your service of the reading of barometers to 0·001 inch, and requesting an expression of my opinion in the matter, I beg to say that the instrumental correction to our barometers is given to thousandths, the temperature corrections also. Unless readings are continued to the same degree of accuracy, the result must often be one hundredth out of the way. It seems important that the hundredth figure should be correct in every instance. I think that this can be secured, and labour resulting from the use of the thousandth figure nearly eliminated as follows: Observers to continue to read to thousandths, and to record this reading in the original record, the corrections to be applied as at present in the original record—in short this record to remain as it is at present, but in all further records, the reading to be given to nearest hundredths, as shown in the original. As the sea level correction is always in hundredths, this can easily be applied.

This plan would have the advantage of always securing accuracy to the hundredths, and also in securing a reading to thousandths in the original which would be accessible, and might often be useful and necessary in barometric reductions and studies of many kinds. The "third figure" would be in existence, but would not be made use of in any regular work, thus saving a considerable amount of labour.

I am, &c.
(Signed) W. B. HAZEN,
Mr. Robert H. Scott. Chief Signal Officer, U.S.A.

(M.O. 1238.) Meteorological Institute, Christiana,
MY DEAR MR. SCOTT, May 26, 1886.

CONSIDERING your circular of the 19th May 1886, I think that for telegraphic messages the reading of the barometer to 0·01 inch is sufficient. But, as your station barometers, duly verified as they are, can by careful reading give the height of the mercurial column to 0·05 mm. or 0·002 inch, and as in many meteorological investigations the 0·1 mm. or 0·004 inch is wanted, I would prefer to have the readings to 0·001 inch continued.

Yours, &c.
Robert H. Scott. (Signed) H. MOHN.

(M.O. 1175.)
MON CHER COLLÈGUE, Paris, le 21 Mai, 1886.

JE partage l'avis du "Meteorological Council" en ce qui concerne la lecture du baromètre dans le stations secondaires. Il est certain que l'approximation de 0·001 pouce est souvent illusoire puis qu'elle correspond à moins de 3 centièmes de millimètre et qu'il faut des instruments précis et une grande expérience pour répondre de cette exactitude.

Cependant dans les observatoires on ne commet pas des erreurs de cet ordre et il y aurait peut-être lieu de conserver les lectures au millième de pouce.

Votre bien dévoué,
À Monsieur R. Scott, Londres. (Signé) E. MASCART.

(M.O. 1288.) Central Meteorological Office, Rome,
DEAR SIR, May 30, 1886.

I HAVE had your circular of the 19th instant under consideration, and I have no objections to make to your proposal to have the barometer read to 0·01 inch instead of to 0·001 inch.

(Signed) P. TACCHINI.
R. H. Scott, Esq.

(M.O. 1273.) Central Meteorological Office, &c. Vienna,
DEAR MR. SCOTT, May 31, 1886.

IN my opinion, the proposal of the Meteorological Council to have individual barometer observations read to 0·01 inch, is quite right, because by that means the large errors of reading (in the 0·01 inch and even in the 0·1 inch) will certainly be lessened. The same will hold as regards the errors of printing and calculation which increase rapidly with the number of figures. But the retention of 0·001 inch is *necessary* in the hourly and monthly means, and the rounding off to 0·01 inch would not exhibit the daily range of the barometer nor the monthly gradients with the necessary precision.

Where the metric scale is employed it is always considered sufficient to give the individual readings to 0·1 mm. and the hourly means to 0·01 mm. But it cannot be maintained that the individual readings are really correct even to 0·1 mm., because in ordinary barometers the depression due to capillary action alone, by its variability, makes a really accurate determination of the air-pressure to tenths of a millimetre illusory. Therefore a hundredth of an inch is quite sufficient.

(Signed) J. HANN.

(M.O. 1774.) Seewarte, Hamburg, August 6, 1886.

IN reply to your inquiry I beg to state that in the opinion of the Seewarte the 0·001 parts of an inch in barometer readings would not be unessential in the determination of the gradient, especially in low latitudes, if they could be determined reliably. But the barometer is by no means an instrument of sufficient precision, to give any certainty to this determination, therefore the

thousandth of an inch may be omitted without hesitation in the readings at ordinary stations, until such time as this instrument is further improved.

(Signed) DR. NEUMAYER.

To the Meteorological Office, London.

(M.O. 1289.)

Royal Meteorological Institute, Utrecht,
May 31, 1886.

MY DEAR SIR,

YOU favoured me with your letter of 19th May asking me if I had any objection that your observers should in future abandon the reading of the barometer to 0·001 inch.

I have none. I think it to be very difficult to be certain of 0·001 inch. On the other side, for well appreciating the departures from the mean normal value, the reading to 0·01 inch is, perhaps, not exact enough.

It is an inconvenience of the English scale that you want for the same exactitude a figure more than those who read the metric scale. As it is, however, I think you could abandon the third decimal without objection, especially if you choose to make use of two sorts of figures, a big one and small ones, for indicating thereby if the hundred parts of an inch were above or beneath the reading. The last figures might be big if the real reading is higher, small if the reading is beneath that figure.

For instance 29·867 could be indicated 29·87.
On the contrary 29·863 should be indicated 29·8c.

So we should know the height up to nearly 0·1 mm., whilst by simply omitting the last figure 29·867 as well as 29·874 is indicated by 29·87, the two observations differing 0·2 mm.

This remark is not of great weight, but if Mr. Mohn thinks necessary to reduce the telegrams of his country every day for the variations of the gravity (g) then I think also this should be observed.

Yours faithfully,
(Signed) BUYS BALLOT.

(M.O. 2444.)

St. Petersburg.

DEAR SIR,

IN reply to the inquiry which I had the honour to receive from the Meteorological Council in their letter of May 19, I have to say that in my opinion the reading of barometers to 0·01 inch at stations of the second and third orders would be quite sufficiently accurate, and that an accuracy of 0·001 inch at such stations would be scarcely attainable.

Unfortunately, however, there are still two barometrical scales in use, and it is to be regretted that the accuracy of 0·01 inch on the English scale does not come up to that of 0·1 mm. which has been adopted for the limiting reading on the metric scale, and it would therefore appear to me to be desirable to adopt a limit of 0·005 on the English scale, if this should not cause any inconvenience either in reading or in printing the results.

I remain, &c.
(Signed) H. WILD.

Read—A letter (No. 2129) from Falmouth Observatory applying for a new chronometer, to replace that supplied in 1867.

Mr. Scott was instructed to have the chronometer forwarded to Greenwich (P.C. 2228), and the Hydrographer kindly undertook to replace it by another instrument.

Reported—Mr. F. Bayard had forwarded to the Office (Letters 2148, 2278) a copy of the monthly means from the Hourly Readings for 1878 (Minutes, p. 36), and that a copy of the Hourly Readings for 1879 had been supplied to him.—Approved.

Submitted—The following report:—

The GALE of OCTOBER 14–16, 1886.

Meteorological Office Telegraph Room,
October 22, 1886.

SIR,

IN accordance with the instructions of the Chairman, I beg to submit herewith a statement showing the times at which warnings were issued to various parts of our coasts on October 14th, 1886, and the principal reasons for their issue.

On the 12th October, in the rear of a large disturbance which had previously skirted our extreme north-west coasts, a well-defined subsidiary depression was formed over the north of England.

By the morning of the 13th, this had passed away to the eastern shores of the North Sea, and, although later in the day it developed further intensity, the system ultimately travelled away in a northerly direction along the west coast of Norway.

At 8 a.m. on the 14th, the disturbance was apparently dispersing in the neighbourhood of Christiansund, and increasing pressures, with moderate breezes from the westward, and fair weather, were reported over the whole of the United Kingdom. Even at our extreme western stations Mullaghmore and Valencia, the barometer had risen steadily since 10 o'clock on the previous evening, and the wind showed no sign of backing.

The only indication whatever at this hour of the advance of any new disturbance was supplied by our Jersey reporter, who stated that cirrus clouds were moving fast from north-west. At 10.25 a.m. information of a precisely similar nature was received by special telegram from

Babbacombe, and under these circumstances it was thought advisable to ask for additional reports from Valencia, Mullaghmore, and (the Scilly cable being under repair) from Prawle Point.

These special reports were made up at noon, and arrived in the Office at various times between 0.30 p.m. and 1 p.m. The Mullaghmore and Prawle Point telegrams showed that no decided change was in progress, but from the Valencia report it appeared that, while the barometer had remained stationary between 8 a.m. and 10 a.m., a fall of 0·07 inch had taken place in the succeeding two hours, and that the wind had suddenly backed to South, with a threatening appearance of the weather. It was therefore evident that an important depression was approaching our western coasts, and at 0.40 *p.m.* the following warning was sent to the *whole of Ireland and the north-west of England.*

"Hoist south cone. Barometer falling Valencia, with threatening appearance."

At 2 *p.m.* the barometer continued to fall steadily at Valencia, and the wind there had freshened from the southward. A less decided fall of the mercury was also reported at the other Irish stations, and the wind was backing in the west generally. The following message was therefore despatched *at* 4 *p.m.* to the *south-west of England and the English Channel as far east as Portsmouth :—*

"Hoist south cone. Deep depression approaching west Ireland."

By 6 *p.m.* the appearance had become far more serious. The barometer was at that time falling rapidly at Valencia (the change since 2 p.m. amounting to 0·36 inch), and the wind there had increased to a fresh gale from South-east. At our other western stations the barometer was also falling decidedly, with moderate South-westerly breezes in the south-west of England, and fresh South-easterly breezes in the north-west of Ireland. At Valencia and Roche's Point rain had commenced. As it was evident that the approaching depression was likely to prove large and deep, the following message was despatched at 7.15 *p.m. to the remainder of our coasts :—*

"Hoist south cone. Deep depression approaching Ireland."

The accompanying table, which has been drawn up from information supplied by the observers at the Telegraphic Reporting Stations, shows the approximate time at which the gale commenced on various parts of our coasts, and also the approximate time which elapsed between the issue of the warning and the commencement of the gale. The sub-division of the districts in this table is the same as that employed for the checking of the storm warnings.

I am, &c.
(Signed) FREDK. J. BRODIE,
for F. GASTER.

To R. H. Scott, Esq., M.A., F.R.S.

Table showing the *Time of Issue of Warnings* to the various Coasts of the British Islands on *October* 14*th*, 1886, with the *Approximate time* of the *Commencement of the Gale*, and the *Time* which *elapsed* between the *Issue of the Warning* and the *Commencement of the Gale.*

Coasts.	Time of Issue of Warning.	Approximate time of Commencement of Gale.	Approximate Time which elapsed between the Issue of Warning and the Commencement of the Gale.
	October 14th.		
Ireland, south - - -	0.40 p.m.	6 p.m. 14th	5 hours
Do. east - - -	Do.	Midt. 14th.	11 do.
Scotland, east - - -	7.15 p.m.	10 p.m. 15th	27 do.
Do. west - - -	Do.	Doubtful about midday 15th	About 17 hours
England, north-west - -	0.40 p.m.	2 or 3 a.m. 15th	14 hours
Do. west - - -	4.0 p.m.	Midt. 14th	8 do.
Do. south { Western half Channel	Do.	Midt. 14th to 3 a.m. 15th	8 to 11 hours
Do. south { Eastern half Channel	7.15 p.m.	4 to 6 a.m. 15th	9 to 11 hours
Do. south-east - - -	Do.	Do.	Do.
Do. east - - -	Do.	Do.	Do.

Submitted—The following report :—

SIR, Meteorological Office, September 30, 1886.

I HAVE the honour to report, for the information of the Council, on the work which has been done during the quarter ending 30th September 1886.

CURRENT CHARTS.

North Pacific Ocean.—The plotting of the current data from the Office logs for the month of February (referred to in my last report 30th June 1886) has been completed, and the plotting for August is in an advanced state.

South Pacific Ocean.—The plotting of the current data from the Office logs for the month of August (which has commenced in July) has been completed.

PRESSURE CHARTS.

The charts of barometric pressure are still in the hands of the printer. The chart of the Atlantic for the month of February has been passed for press, and the chart for the Indian Ocean for the same month is under revise.

I was absent for one month summer vacation during the quarter, and from the 1st to the 21st July discharged the duties of Marine Superintendent, which occupied the whole of my time for that period.

I am, &c.
(Signed) C. W. BAILLIE,
Nav.-Lieutenant, R.N.

The Marine Superintendent.

Forwarded for the information of the Council.
(Signed) HENRY TOYNBEE,
Marine Superintendent.

Submitted—The following report on the forecasts for July 1886 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

JULY.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	33	52	43	80
,,	b	41	33	37	
,,	c	19	11	15	
,,	d	7	4	5	
Scotland, E.	a	52	52	52	84
,,	b	33	30	32	
,,	c	15	3	9	
,,	d	0	15	7	
England, N.E.	a	67	56	62	93
,,	b	30	33	31	
,,	c	3	7	5	
,,	d	0	4	2	
England, E.	a	67	70	69	91
,,	b	26	19	22	
,,	c	7	7	7	
,,	d	0	4	2	
Midland Cos.	a	74	56	65	91
,,	b	22	30	26	
,,	c	4	11	8	
,,	d	0	3	1	
England, S.	a	70	56	63	91
,,	b	26	30	28	
,,	c	0	3	2	
,,	d	4	11	7	
Scotland, W.	a	56	37	47	84
,,	b	37	37	37	
,,	c	7	22	14	
,,	d	0	4	2	
England, N.W.	a	52	48	50	78
,,	b	30	26	28	
	c	15	15	15	
	d	3	11	7	
England, S.W.	a	63	63	63	86
,,	b	30	15	23	
,,	c	7	15	11	
,,	d	0	7	3	
Ireland, N.	a	52	63	58	74
,,	b	22	11	16	
,,	c	15	15	15	
,,	d	11	11	11	
Ireland, S.	a	48	48	48	78
,,	b	22	37	30	
,,	c	22	11	16	
,,	d	8	4	6	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecasts.	Percentage of Success a + b.
Scotland, N.	a	58	48	53	84
,,	b	32	29	31	
,,	c	10	10	10	
,,	d	0	13	6	
Scotland, E.	a	71	52	62	89
,,	b	19	35	27	
,,	c	10	3	6	
,,	d	0	10	5	
England, N.E.	a	68	45	57	89
,,	b	23	42	32	
,,	c	6	7	7	
,,	d	3	6	4	
England, E.	a	77	61	69	86
,,	b	13	20	17	
,,	c	10	13	11	
,,	d	0	6	3	
Midland Cos.	a	55	52	54	83
,,	b	36	23	29	
,,	c	6	19	13	
,,	d	3	6	4	
England, S.	a	71	55	63	83
,,	b	23	16	20	
,,	c	6	13	6	
,,	d	0	16	11	
Scotland, W.	a	61	45	53	84
,,	b	39	23	31	
,,	c	0	23	12	
,,	d	0	9	4	
England, N.W.	a	71	52	62	83
,,	b	23	19	21	
,,	c	6	16	11	
,,	d	0	13	6	
England, S.W.	a	52	55	54	81
,,	b	35	19	27	
,,	c	13	16	14	
,,	d	0	10	5	
Ireland, N.	a	42	42	42	71
,,	b	29	29	29	
,,	c	13	19	16	
,,	d	16	10	13	
Ireland, S.	a	48	42	45	71
,,	b	10	42	26	
,,	c	23	13	18	
,,	d	19	3	11	

SUMMARY.

British Isles	a	58	55	57	85
,,	b	29	27	28	
,,	c	10	11	10	
,,	d	3	7	5	
British Isles	a	61	50	56	82
,,	b	26	27	26	
,,	c	9	14	12	
,,	d	4	9	6	

Submitted—The following report on the forecasts for August 1886:—

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

AUGUST.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	58	58	58	81
"	b	31	15	23	
"	c	4	8	6	
"	d	7	19	13	
SCOTLAND, E.	a	42	50	46	85
"	b	39	38	39	
"	c	15	4	9	
"	d	4	8	6	
ENGLAND, N.E.	a	46	54	50	83
"	b	35	31	33	
"	c	12	8	10	
"	d	7	7	7	
ENGLAND, E.	a	50	58	54	89
"	b	38	31	35	
"	c	8	4	6	
"	d	4	7	5	
MIDLAND COS.	a	50	62	56	91
"	b	38	31	35	
"	c	8	0	4	
"	d	4	7	5	
ENGLAND, S.	a	50	58	54	89
"	b	38	31	35	
"	c	8	0	4	
"	d	4	11	7	
SCOTLAND, W.	a	58	50	54	81
"	b	27	27	27	
"	c	11	4	8	
"	d	4	19	11	
ENGLAND, N.W.	a	50	42	46	81
"	b	27	42	35	
"	c	15	4	9	
"	d	8	12	10	
ENGLAND, S.W.	a	46	50	48	77
"	b	27	31	29	
"	c	15	12	14	
"	d	12	7	9	
IRELAND, N.	a	39	54	47	78
"	b	31	31	31	
"	c	15	11	13	
"	d	15	4	9	
IRELAND, S.	a	42	54	48	77
"	b	19	38	29	
"	c	27	0	13	
"	d	12	8	10	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	49	58	54	79
"	b	35	16	25	
"	c	13	7	10	
"	d	3	19	11	
SCOTLAND, E.	a	65	52	59	88
"	b	26	32	29	
"	c	9	13	11	
"	d	0	3	1	
ENGLAND, N.E.	a	61	49	55	87
"	b	26	35	31	
"	c	13	3	8	
"	d	0	13	6	
ENGLAND, E.	a	58	58	58	84
"	b	29	23	26	
"	c	13	10	12	
"	d	0	9	4	
MIDLAND COS.	a	58	58	58	86
"	b	32	23	28	
"	c	10	10	10	
"	d	0	9	4	
ENGLAND, S.	a	55	68	62	88
"	b	39	13	26	
"	c	6	10	8	
"	d	0	9	4	
SCOTLAND, W.	a	55	27	41	78
"	b	26	47	37	
"	c	10	6	8	
"	d	9	20	14	
ENGLAND, N.W.	a	49	37	43	79
"	b	35	37	36	
"	c	6	6	6	
"	d	10	20	15	
ENGLAND, S.W.	a	42	39	41	70
"	b	32	26	29	
"	c	20	13	16	
"	d	6	22	14	
IRELAND, N.	a	58	49	54	81
"	b	23	32	27	
"	c	3	13	8	
"	d	16	6	11	
IRELAND, S.	a	52	55	54	84
"	b	26	35	30	
"	c	9	7	8	
"	d	13	3	8	

SUMMARY.

BRITISH ISLES	a	48	54	51	83
"	b	32	31	32	
"	c	13	5	9	
"	d	7	10	8	
BRITISH ISLES	a	55	50	53	82
"	b	30	29	29	
"	c	10	9	10	
"	d	5	12	8	

Submitted—The following report on the forecasts for September 1886 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

SEPTEMBER.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	31	65	48	81
,,	b	54	12	33	
,,	c	8	4	6	
,,	d	7	19	13	
SCOTLAND, E.	a	42	35	39	77
,,	b	42	35	38	
,,	c	12	11	12	
,,	d	4	19	11	
ENGLAND, N.E.	a	54	62	58	95
,,	b	42	23	33	
,,	c	0	8	4	
,,	d	4	7	5	
ENGLAND, E.	a	46	58	52	90
,,	b	50	27	38	
,,	c	0	11	6	
,,	d	4	4	4	
MIDLAND COS.	a	46	54	50	85
,,	b	42	27	35	
,,	c	12	12	12	
,,	d	0	7	3	
ENGLAND, S.	a	50	62	56	87
,,	b	42	19	31	
,,	c	8	12	10	
,,	d	0	7	3	
SCOTLAND, W.	a	46	58	52	76
,,	b	35	12	24	
,,	c	12	15	13	
,,	d	7	15	11	
ENGLAND, N.W.	a	38	50	44	88
,,	b	46	42	44	
,,	c	8	4	6	
,,	d	8	4	6	
ENGLAND, S.W.	a	38	50	44	81
,,	b	50	23	37	
,,	c	12	8	10	
,,	d	0	19	9	
IRELAND, N.	a	48	54	51	90
,,	b	48	29	39	
,,	c	0	4	2	
,,	d	4	13	8	
IRELAND, S.	a	44	54	49	77
,,	b	39	17	28	
,,	c	13	8	11	
,,	d	4	21	12	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a. + b.
SCOTLAND, N.	a	35	48	42	78
,,	b	34	38	36	
,,	c	28	4	16	
,,	d	3	10	6	
SCOTLAND, E.	a	48	52	50	76
,,	b	31	21	26	
,,	c	14	7	11	
,,	d	7	20	13	
ENGLAND, N.E.	a	52	52	52	80
,,	b	31	24	28	
,,	c	7	7	7	
,,	d	10	17	13	
ENGLAND, E.	a	66	38	52	83
,,	b	24	38	31	
,,	c	7	17	12	
,,	d	3	7	5	
MIDLAND COS.	a	66	31	49	76
,,	b	27	28	27	
,,	c	7	24	16	
,,	d	0	17	8	
ENGLAND, S.	a	59	55	57	80
,,	b	31	14	23	
,,	c	7	17	12	
,,	d	3	14	8	
SCOTLAND, W.	a	45	55	50	74
,,	b	31	17	24	
,,	c	7	14	11	
,,	d	17	14	15	
ENGLAND, N.W.	a	45	52	49	83
,,	b	34	34	34	
,,	c	14	7	10	
,,	d	7	7	7	
ENGLAND, S.W.	a	54	43	49	82
,,	b	35	32	33	
,,	c	7	7	7	
,,	d	4	18	11	
IRELAND, N.	a	41	46	44	86
,,	b	48	36	42	
,,	c	0	14	7	
,,	d	11	4	7	
IRELAND, S.	a	44	57	51	91
,,	b	44	36	40	
,,	c	4	0	2	
,,	d	7	7	7	

SUMMARY.

BRITISH ISLES	a	44	55	50	84
,,	b	44	24	34	
,,	c	8	9	8	
,,	d	4	12	8	
BRITISH ISLES	a	50	48	49	81
,,	b	34	29	32	
,,	c	9	11	10	
,,	d	7	12	9	

Submitted—The following statements of work for the months of July, August, and September 1886:—

MARINE ROOM.

October 21, 1886.

Examined 54 new logs and 7 light-house registers.

North Atlantic Weather Charts.

Completed the reduction by eidograph of the charts for February 1883 and advanced the reduction of March.

Forwarded to the lithographer reduced charts to February14, 1883 (the end of the second series). Proofs received and passed for press to November 30, 1882.

Prepared a key chart for the "Explanatory Notes" to accompany the first series issued.

Specimen charts prepared showing various high-pressure values in shades of red, and low-pressures in blue.

The female clerks engaged on the reduction of charts and preparing them for the lithographer.

General.

Discussion of Red Sea data. In addition to the observations contained in our own logs and those supplied by the Dutch Meteorological Institute, the Peninsular and Oriental Company have kindly lent 171 logs kept on board their steamers passing through the Red Sea.

Copying observations contained in an American log into log No. 6000.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE.
Marine Superintendent.

PANTAGRAPH ROOM.

October 1, 1886.

Observatory Returns.—Hourly Readings, 1883. Part IV. Proof checked and signed for press Proof of monthly and annual tables checked and signed for press. Appendix, (containing tables of temperature results obtained by Harmonic Analyser, &c., 56 pp.) copied for printer, and proof read twice.

Part I., 1884. Daily and five-daily means, vapour tension values, &c. worked. Hourly Readings copied and sent to printer. Proof signed for press up to end of February. Working of means, and copying of values for April (Part II.) about two-thirds done.

Quarterly Weather Report.—Part I., 1878. The tables and plates have been completed. Proofs of the whole have undergone two revises, and the part has been signed for press. Part II. The chart plates have been drawn and proofs received and examined. The monthly plates and gale tables prepared, and the "General Summary" nearly completed. Part III. The gale tables prepared and the "General Summary" written. The chart plates are in hand, but not far advanced.

Harmonic Analyser.—The analysis of the barograms for 1874 have been completed, and those for 1875 are now in hand. The curves for that year of three of the seven observatories have been passed through the instrument.

Most of the summer vacation has been taken during the period covered by this report.

Miscellaneous.—The Bunhill Row sunshine cards tabulated and values sent to Royal Meteorological Society. The dating and stamping of sunshine cards has been kept up to date.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S., &c.

EXAMINATION ROOM.

SIR, October 1, 1886.

DURING the interval since the date of my last report (1st July), the following work has been done in this department:—

Examinations.

March (1884).—Five *anemograms.*

April (1884).—Three *thermograms;* three *barograms;* and five *anemograms.*

May (1884).—Three *thermograms;* three *barograms;* and five *anemograms.*

Checking the values and times of the daily maxima and minima temperatures, at Falmouth, May–December 1884.

Weekly examination on receipt of curves and documents from all stations.
Partial examination of the Valencia thermograms and barograms for April-September 1886 for the Registrar General of Ireland.

Reports, &c.

Notes of Errors to Aberdeen, Armagh (anemograms), Falmouth, Kew (anemograms), and Valencia, for March–May 1884, and report thereon to Council.

Miscellaneous.

The retirement of Mr. Aldridge (31st July), and the instructing his successor, Mr. Call (who did not enter upon his duties until the 23rd August), combined with my absence on vacation from the 2nd—30th August, materially retarded the work of the department.

I am, &c.

R. H. Scott, Esq., F.R.S. (Signed) T. E. Allen.

Mr. Scott was instructed to prepare a special report on the results of the new stations from which telegraphic reports are received for the daily forecasts (Minutes, p. 42) with remarks as to defects, and what should be done to remedy these.

Submitted—The following reports :—

Report of the Inspection of the Irish and Welsh Stations, 1886.

Gentlemen.

I have to report that I have completed the inspection of these stations, with the exception of four of those which furnish information for the Weekly Weather Report, viz., Foynes, Kilkenny, Killarney, and Llandovery, which were not considered to require visiting this year.

The stations of Malin Head and Londonderry were visited by Captain Toynbee.

Telegraphic Stations.

Holyhead, visited September 16.—I found that the rain-gauge and thermometer screen were too much overshadowed by shrubs, and directed the observer to have the necessary alterations effected. The station otherwise was in good order. I took down one of the new hand anemometers to this station and instructed the observer in its use.

Donaghadee, visited September 21.—This station was, as usual, in good order, and calls for no remark.

Mullaghmore, visited September 23.—The only defect I discovered at this station was that the index of the minimum thermometer was occasionally left partially dry, so that the indications were incorrect A new instrument is to be supplied.

Belmullet, visited September 25.—The reports from this station have shown a marked improvement during the last twelve months. A weathercock has been erected, so that the reports of wind direction have been more correct. The observer takes great interest in the work, and I have no doubt will further improve.

Malin Head, visited by Captain Toynbee, July 1.—This station is not perfectly satisfactory, as the reporter, Lloyd's signalman, frequently reads the barometer incorrectly. His brother, who is Lloyd's agent, does the work correctly, but he lives at a distance from the Signal Tower, and so cannot give constant attention to the reports. We must endeavour to effect an improvement by correspondence.

Parsonstown, visited September 30.—This station was satisfactory as usual.

Roche's Point, visited October 4.—There is nothing particular calling for remark at this station, except that Lord Fermoy, the landlord, has applied for rent for the enclosed site of the thermometer screen. I recommend that a rent, not exceeding 1*l.* annually, be paid.

Valencia, visited October 6.—The telegraphic reporting duty at this station is satisfactory, except that the observer does not furnish very full cloud reports. I took down the electric anemometer with me, to Valencia, as will be explained later.

St Anne's Head, visited October 11.—This station is quite satisfactory, excepting that tourists have again been interfering with the instruments. I have had to direct that a wire cover should be placed over the sunshine recorder.

Weekly Weather Report Stations.

The stations of Edgeworthstown (Currygrane), and Waterford (Brook Lodge), were visited September 28 and October 8 respectively; they were both in good order. At the latter station Mr. Bolton the observer was unfortunately absent on the day of my visit.

Stations of the Second Order.

Armagh, visited September 22.—The thermometers and rain-gauge have been removed to their new site in the enclosure on the south side of the observatory since the date of my last visit. This is a decided improvement.

I beg to draw the attention of the Council to the fact that the barograph and thermograph are still stored at Armagh.

Dublin (*Fitzwilliam Square*), visited September 20.—The station remains as satisfactory as is possible for the locality. The observer's rain-gauge is worn out, and I have supplied him with another, on loan.

Dublin (*Glasnevin*), visited September 20.—At this station the thermometer screen and rain-gauge have been slightly moved. The instruments, &c. are in good order.

Dublin (*Mountjoy Observatory*), visited September 20.—The only matter calling for notice at this station is that the wind reports are unsatisfactory. The instrument is a small anemometer, its indications (means per hour), are converted by James' Table to pressures per square foot, and these again to the figures by Beaufort's scale, with the result that the force reported is much too low. I would recommend that as Sir C. Wilson prefers an instrumental observation, one of Wild's swinging pressure plates be supplied.

Colebrooke, visited September 23.—This stations calls for no special remark.

Parsonstown, visited September 30.—See Report above.

Markree, visited September 24.—This station continues in very good order.

St. David's, visited October 9.—At this station the thermometers and rain-gauge have been removed to a fresh site, much more open than that previously available. The station is in very good order.

Londonderry, visited by Captain Toynbee June 30, and found to be in a satisfactory condition.

Observatory.

Valencia, visited October 6.—I had hoped to have been able to report as to the electrical anemometer, but the letters have not arrived at the Office. There is nothing else calling for remark.

Yours, &c.
(Signed) Robert H. Scott.

The following table shows the results of thermometric comparisons :—

Corrections to be applied to the readings of—

Stations.	Dry Bulb.	Wet Bulb.	Max.	Min.	Spare Ther.	Remarks.
Stations of the Second Order.						
Armagh	−0·3	−0·2	−1·1	—	−0·3	
Parsonstown	−0·3	0·0	−0·4	0·0	—	
Brookborough	−0·8	−0·6	−0·4	−0·5	—	
Dublin (City)	−0·4	−0·4	−0·5	0·0	−0·5	
Dublin (Phœnix Park O.S.O.).	−0·2	−0·4	−0·2	+0·5	—	Grass min. −0·1.
Glasnevin	−0·3	−0·5	−0·5	+0·3	—	Do. do.
Markree Castle	0·0	0·0	+0·1	+0·1	—	
St. David's	−0·6	−0·6	−0·2	−0·6	—	Do. −0·4.
Londonderry	−0·4	−0·4	−1·6	−0·2	—	
Telegraphic Reporting Stations.						
Belmullet	−0·4	−0·4	−0·1	−0·3	—	Spare ther. broken in testing.
Donaghadee	−0·5	−0·7	−0·1	−0·2	—	
Malin Head	−0·4	−0·5	−0·8	−1·8	−0·6	
Mullaghmore	−0·2	−0·2	−0·1	+0·2	−0·3	
Valencia	−0·7	−0·6	−0·9	+0·4	−1·0	
St. Ann's Head	−0·6	−0·2	−1·2	−0·3	−0·7	
Holyhead	−0·2	−0·3	−0·4	−0·2	−0·3	
Weekly Weather Report Stations.						
Edgeworthstown	−0·3	−0·3	−0·3	+0·1	—	Grass min. +0·4.
Waterford	−0·6	−0·6	−0·6	−0·2	—	Do. do.

Report of the Inspection of the English Stations, 1886.

I have the honour to submit the following report of the stations in England inspected by me this year. The work of inspection occupied the greater part of July and the last week of September.

Telegraphic Reporting Stations.

Jersey (Noirmont), June 23.—The observations are excellently conducted at this station, and the instruments are all in good order. I removed the sunshine recorder to this station on April 18. It subsequently required some shifting.

Hurst Castle, July 3.—The observations at this station are fairly good, but the direction of the winds reported is not reliable. The very high maximum temperatures occasionally reported have been I think due, principally at least, to the extreme mobility of the index column of the maximum thermometer, coupled with a certain amount of unskilfulness in the observer. A new maximum has therefore been sent to this station on the 3rd of August.

The barometers are in good order. I removed them to a position a few yards from that which they have hitherto occupied, in order to obtain a rather better light, and to avoid the afternoon sunshine.

The thermometer screen required repainting and some repairs, about which directions were given.

Dungeness, July 6–9.—The work done at this station has been in several respects unsatisfactory. The light-keepers, four in number, take the readings of the instruments in rotation when on duty, as mentioned in last year's report. They are as yet by no means careful observers. The barometric readings as reported to the Meteorological Office had during the past year been frequently too low, and the observers having been made aware of this, set the verniers (when first taking lessons with me) much too high. They all however understand how to read the scale correctly. On the last day of their barometer drill the best of the observers gave me accurate readings, while the worst error was one of + ·005 in.

The low minima of temperature often reported did not appear to me to be attributable to volatilization or to interruption of the thread of spirit in the thermometer, which is a good instrument, but to carelessness on the part of the light-keepers, sometimes in reading, and at other times in setting the instrument.

The barometer, No. 619, had been moved into the tower by one of the observers, Mr. Curnow. I hung the other barometer, No. 618, by the side of it.

It will be seen in the table that the difference of the readings of the two instruments is rather large. Both the tubes are free from air.

The wet-bulb was much crusted. The remaining instruments were in good order.

Yarmouth, July 12.—I found the instruments at this station in good order, and well attended to, as usual. The trace of the self-registering aneroid is faint, and a grey fungoid growth is noticeable upon the aniline ink in the recording pen, but I could suggest no remedy except frequent attention and occasional cleaning.

I took down to this station a small self-registering anemometer.

The large anemometer was in good order.

Loughborough, July 14.—The observations at this station are exceptionally good, and I found all the instruments in perfect order. I experimented with the small self-registering anemometer in the observer's garden, the estimated wind force being 4 at the time, with unsatisfactory results.

Spurn Head, July 16.—The barometric reports from this station have still appeared to be somewhat low, and this may possibly be due to the observer having set the vernier too low.

The instruments were all in very good order. The great drawback in the instance of this excellently exposed station is the sand-drift. The sand almost constantly coats the wet-bulb, and during the time that I removed the thermometers for comparison (about 80 minutes) the wind, then blowing with the estimated force 4, had filled with sand every interstice in the closed screen, from which I had previously swept the sand. In rainy weather much wet sand occupies the funnel of the rain-gauge.

For wind reports the great superiority of this station over others on our east coast is unquestionable.

York, July 18.—Some improvement is shown in the observations at this station, and the observer reads and reduces correctly. The rain-gauge had now become quite useless, and it had become necessary to employ that which is used for the 9 o'clock observations.

The barometer is now in good order.

The observer, as I have previously reported, has imperfect opportunities of determining the force, and even the exact direction, of the surface winds.

North Shields, July 21.—The instruments, with the exception of the small self-registering anemometer (which was out of order), were all in good order, and the observations are, as usual, well attended to.

At the time of my visit the large anemometer had not been erected.

Barrow-in-Furness, July 26.—Everything at this station appeared to be in good order. The barometer is sluggish, but contains no air.

Scilly (St. Mary's), September 25–27.—I took to this station the self-registering aneroid which was sent back last year for repairs. I left it in good working order, having adjusted it to the mercurial standard, but the clock required a little further regulation.

All the instruments were in excellent order. The screen had lost some of the internal louvre-boards. I gave directions as to their replacement. If copper screws were used in the manufacture of the Stevenson screen, the screen would, I think, be considerably more durable.

The anemometer worked well at the date of inspection. It is a difficult matter to attend to this instrument during a southerly gale with rain, and the observer asks for the erection of some shelter, such as a sheet of galvanized iron with light boardings on the steps of the pillar, but I believe that this would, in all probability, seriously interfere with the motion of the air striking the cups.

Prawle Point, September 28.—The observer, Mr. J. John, was absent on leave at the date of my inspection, and the chief boatman, Mr. McLegen, took the readings, reading the barometers with precision, but the thermometers a little too high. The instruments were all in good order, except that the rain-gauge, which is attached to an extremely firm block, required raising on the south-east, and that the wet-bulb was not quite clean. A very careful look-out for weather is maintained at this station.

Stations of the Second Order and Weekly Weather Reporting Stations.

Southampton, July 2.—Everything appeared to be in good order, as usual, at this station, except that the sunshine recorder (which has a perfect exposure) required a trivial alteration. The observer was absent in the morning, and had just left the Ordnance Offices in the afternoon, when my arrival was delayed by an election mob. I was consequently, after a day's delay, obliged to make my inspection at night, and the comparisons of the instruments were made under unfavourable conditions. The maximum appears to give rather high and the minimum rather low readings.

St. Leonards, July 10.—This station is now an exceedingly good one, the positions of the instruments being admirable. I ascertained, first from barometrical comparisons and secondly by levelling, that the cistern of the barometer is 31·5 feet above an Ordnance mark, which is itself 114·3 above M.S.L. The barometer cistern is thus 145·8 above M.S.L.

Epsom (*Royal Medical College*), July 11.—This is a new station, which promises well. The returns at the date of my inspection were slightly incomplete, and some reduction errors were noticeable, but great improvement may be anticipated. The Stevenson's screen and rain-gauge have a complete exposure, being in a large lawn on the front or north-west side of the College. There is a gentle fall of the ground towards west-north-west. The outdoor instruments are 272 feet above M.S.L., and the cistern of the reporting barometer 304 feet. The instruments were all in excellent order.

The station appears to be fairly well situated for observations of the wind, but is slightly sheltered from Easterly winds by the Downs.

Geldeston, July 12.—A larger screen was, on January 1st, 1885, substituted for the Stevenson's previously in use at this station, details of previous comparative readings in the two screens being sent to the Meteorological Office. The instruments at this station, including thermograph, barograph, &c., were, as usual, in excellent order. The sunshine recorder required a slight adjustment, the slate by which it was supported on the south-east having been partially displaced.

Leicester, July 13–14.—At this station, the instruments were found to be in tolerably good order. The observer is painstaking, but he fails to read the instruments with complete accuracy. A new grass minimum had been employed since the 10th of July; its readings are somewhat low. The wind-force was over-estimated by the observer on the 14th. The sunshine recorder required readjustment.

Sheffield, July 15.—The instruments at this station are most carefully attended to, and the returns are very accurate and full, but it has hitherto been impossible to obtain readings at 9 instead of at 6 p.m. The buildings on the west of the out-door instruments, prospectively alluded to in my last year's report, are now in course of erection, but are not likely to be completed before May 1887. In the meantime it is not certain where the new gravel walks will be laid down, and the instruments have therefore not been shifted. The general exposure in the park is excellent, but for the present the screen and rain-gauge are somewhat sheltered by building sheds. The readings of two earth thermometers are now taken at 9 a.m. There is some hope that when the new Art Gallery is completed the anemometer, which is now at the Borough Hospital, may be transferred to the Museum, where it could be regularly attended to. The station is altogether an excellent one.

York, July 17–18.—The observations are fairly good. A few mistakes have been made in the reductions of the barometer readings, but the observer is competent. The Bootham Friends' School, on the ridge of the roof of which the sunshine recorder is erected, was closed for the holidays, and I could not learn by whom the cards were now attended to. The instrument was correct as regards level, but quite out of adjustment as regards time. It is erected on a very high thin framework of wood attached by six wires to surrounding chimney-tops, and is by no means easy of access, still less of adjustment.

Whitby, July 19.—The observations at Whitby Lighthouse were commenced at the beginning of 1886. They are conducted very efficiently by Mr. Powell, whose daughter also in his temporary absence takes the observations well. The lighthouse and buildings have the sea on the north-east and are situated close to the edge of the cliff, which is here nearly perpendicular. The barometer cistern is 203 feet above M.S.L. The thermometer screen, which is a Royal Meteorological Society screen, and the rain-gauge, have a complete exposure in the garden to the south-west of the lighthouse. A few hundred yards to the west, the ground rises with a somewhat steep incline to a level of about 65 feet above the garden, while to the north and north-west, there is also a rise of

50 feet or more. Winds from west and north-west will consequently be felt at the station itself with diminished force. The minimum thermometer, having the thread of the alcohol broken, had been sent to a local optician who inserted the instrument in boiling water. The existing instruments were all in excellent order, and the station promises to be a useful one.

Durham, July 20.—Since Mr. Carpenter's appointment, the observations have been very efficiently taken at 9 a.m. and 9 p.m. In March 1886 the rain-gauge had to be slightly lowered, but the instruments are otherwise unchanged. The thermometers read very correctly, but I have not the slightest doubt that the nature of the screen causes the readings to be too high, perhaps by as much as a degree. The observer is most careful and attentive.

Seaham, July 20.—On June 1, 1886, a complete change was made in the position of the out-door instruments. They were removed into the south-east corner of the large new cemetery ground, which is distant between 800 and 900 yards from their former site, and is at a somewhat greater elevation. The change of position was most desirable, as the instruments have now a true exposure. They were in fairly good order, but the maximum thermometer read 0°·6 too low, an error which, if the corrections since supplied to the observer were employed, would amount to 0°·9. Mr. Aird promised me to have the screen at once painted with a light colour. It was painted green in 1885, as mentioned in that year's report.

Penrith (*Newton Observatory*), July 22.—This is an admirably equipped station, and all the instruments, including barometers, anemometer, sunshine recorder, thermograph, and self-registering aneroid were in excellent order. The thermometer screens and rain-gauges have complete exposure. The returns are very full and correct. Mr. Benn was absent at the time of my visit. His assistant, Mr. Rownsey, took the readings very correctly.

Cronkbourne (*Isle of Man*), July 25.—I found all the work at this station in its usual unexceptionable condition. The instruments are in excellent order, the observations carefully taken and fully reported.

Douglas (*Isle of Man*), July 25.—This is a new station. The observer, Mr. T. Keig, appears to be careful and painstaking, and the thermometers are good instruments. The screen is a wall screen, and the boarded flooring which surrounds it is unfavourable for the observations of temperature. The screen is also single louvred. The observations here taken are, I believe, locally published as indicative of the climatology of Douglas. I should say that, on the average, the temperatures reported would be 2°·5 too high. The rain-gauge, like the thermometer screen, is on a portion of the roof, and has a most indifferent exposure. The barometer, an ordinary fishery barometer, stands in an adjoining room, and its cistern is 56 feet above M.S.L. The house is in the middle of the town on a considerable slope. I should question the desirability of publishing the returns from this station.

Plymouth, September 23.—I again inspected this Weekly Weather Reporting Station, since on the 1st of January 1887 Dr. Merrifield intends to commence reporting from his new house in Hobart Terrace, and it seemed desirable to report on the nature of the new sites for the instruments. These will be very good, and the rain-gauge especially will have a true exposure, instead of being much sheltered as at present on the south-east. The sunshine recorder will also have an almost if not quite, perfect exposure.

I found the instruments in good order as on all former occasions.

Helston, September 24.—At the date of my visit the last sheet returned from this station was that for September 1883. The observer continues to be in rather weak health, and somewhat overworked in his profession as a schoolmaster. He is desirous of obtaining the assistance of the Meteorological Office in some of the reduction work.

Arlington Court (*near Barnstaple*), September 29.—It is unfortunate that the returns from this station, occupying the position which it does, should have shown no improvement since my visit in 1885. The situation of the out-door instruments is good, and the thermometers and rain-gauges are in good order. The barometer is unfavourably placed and is not very accurate.

Chatham, October 14.—The observer was absent at the date of my visit. One of the deputy observers took readings with me correctly. The barometer and thermometers (excepting the minimum, which had 2° of spirit detached which had been unnoticed) were in fairly good order. A new screen is absolutely necessary, and has been ordered. The old Stevenson screen is falling to pieces, and a screen recently sent down to the station is of an obsolete kind and is rejected. The great obstacle to the efficiency of this station is the difficulty of obtaining a permanent observer, and the impossibility at present of getting 9 p.m. observations punctually taken, owing to the varying duties of the officers who attend to the observations. An application was made in 1885 for the appointment of a pensioner as permanent observer. This was refused, but the application has now again been made.

In the last column of the table appended to this report the letters A, B, and C indicate what I consider the quality of the observations taken at the stations, with no reference to the correctness or want of correctness of the instruments employed. A signifies that adequate care is taken by the observers, and that the station is a satisfactory one; B that the observations as taken are not quite satisfactory; C that the present state of the observations taken is unsatisfactory. In no instance, as regards the stations inspected in 1886, do I wish it to be understood that a station appears to me to be of so little value as to make it desirable that it should be at once relinquished.

(Signed) W. Clement Ley.

October 15, 1886.

Barometer and Thermometer Readings, Stations in England, 1886.

Station.	Reporting Barometer.	Difference of Observer's from Inspector's Readings.	Check Barometer.	Difference of Observer's from Inspector's Readings.	Dry Bulb.			Wet Bulb.			Maximum.			Minimum.			Spare.			Condition of Station.
					Temp. in Water.	Correction to reduce to Inspector's Standards.	Correction as applied or supplied.	Temp. in Water.	Correction to reduce to Inspector's Standards.	Correction as applied or supplied.	Temp. in Water.	Correction to reduce to Inspector's Standards.	Correction as applied or supplied.	Temp. in Water.	Correction to reduce to Inspector's Standards.	Correction as applied or supplied.	Temp. in Water.	Correction to reduce to Inspector's Standards.	Correction as applied or supplied.	
Arlington	29·56	+·02	—	—	58·1	+0·3	—	58·1	+0·3	—	58·0	+0·4	—	57·4	+1·0	—	—	—	—	C
Barrow-in-Furness	29·503	−·003	—	—	58·8	+0·2	−0·4	59·0	0·0	−0·3	58·7	+0·3	−0·1	56·8	+0·2	−0·1	—	—	—	A
Chatham	29·614	·000	—	—	55·3	0·0	+0·1	56·2	−0·9	−0·8	55·3	0·0	0·0	56·2	−0·9	−0·7	55·3	0·0	0·0	C
Cronkbourne	29·442	−·004	—	—	60·8	−0·1	—	60·9	−0·2	—	60·8	−0·1	+0·1	60·5	+0·2	+0·4	60·3	+0·4	—	A
Douglas	29·608	+·002	—	—	63·0	−0·1	0·0	62·9	0·0	−0·1	63·0	−0·1	−0·6	62·8	+0·1	−0·2	—	—	—	B
Dungeness	30·092	+·018	30·100	—	64·5	+0·1	—	64·4	+0·2	—	64·2	+0·4	—	64·6	0·0	—	—	—	—	C
Durham	29·689	−·001	—	—	59·9	0·0	0·0	59·9	0·0	0·0	59·9	0·0	+0·1	59·5	+0·4	+0·5	59·9	0·0	—	A
Eosom	29·818	−·002	—	—	62·1	+0·1	−0·1	62·0	+0·2	0·0	62·0	+0·2	0·0	62·2	0·0	−0·1	—	—	—	A
Geldeston	29·949	·000	—	—	59·9	0·0	+0·1	60·0	−0·1	−0·1	59·9	0·0	−0·2	59·4	+0·5	−0·1	60·0	−0·1	0·0	A
Helston	30·092	·000	—	—	55·0	−0·1	—	54·9	0·0	—	54·8	+0·1	−0·2	54·4	+0·5	+0·1	—	—	—	B
Hurst Castle	30·417	−·001	30·409	−·004	64·4	+0·3	—	64·8	−0·1	—	64·4	+0·3	—	63·5	+1·2	—	—	—	—	B
Jersey, Noirmont	29·802	·000	29·805	−·001	57·6	0·0	—	57·9	−0·3	—	57·4	+0·2	—	57·2	+0·4	—	—	—	—	A
Leicester	29·334	−·004	—	—	59·2	0·0	—	59·1	+0·1	—	59·1	+0·1	—	58·7	+0·5	—	—	—	—	B
Loughborough	29·440	·000	—	—	56·8	−0·1	0·0	56·7	0·0	0·0	56·4	+0·3	0·0	56·3	+0·4	0·0	—	—	—	A
Newton (Penrith)	29·003	−·003	—	—	60·3	0·0	—	60·3	0·0	—	60·3	0·0	—	60·0	+0·3	—	60·0	+0·3	—	A
Plymouth	—	—	—	—	—	—	—	—	—	—	56·6	−0·5	0·0	55·1	+1·0	+1·0	—	—	—	A
Prawle Point	29·850	·000	29·850	·000	57·9	−0·1	—	57·8	0·0	—	58·0	−0·2	—	57·7	+0·1	—	—	—	—	A
St. Leonards	—	·000	—	—	66·1	0·0	—	66·2	−0·1	—	65·8	+0·3	—	65·8	+0·3	—	65·9	+0·2	0·0	A
Scilly, St. Mary's	30·200	·000	30·200	·000	57·7	+0·2	—	57·9	0·0	—	57·9	0·0	—	57·8	+0·1	—	58·0	−0·1	—	A
Seaham	29·968	·000	—	—	65·7	−0·2	—	65·6	−0·1	—	64·9	+0·6	−0·3	65·0	+0·5	—	—	—	—	A
Sheffield	29 336	−·002	—	—	59·8	0·0	0·0	60·0	−0·2	−0·1	59·6	+0·2	0·0	59·3	+0·5	−0·1	—	—	—	A
Shields, North	29·850	·000	29·846	+·002	62·4	−0·1	—	62·2	+0·1	—	62·2	+0·1	—	62·0	+0·3	—	62·4	−0·1	—	A
Southampton	30·323	·000	—	—	66·4	+0·2	—	66·5	+0·1	—	67·0	−0·4	—	66·2	+0·4	—	—	—	—	A
Spurn Head	29·701	−·004	29·704	−·006	60·3	−0·2	—	60·1	0·0	—	59·9	+0·2	—	60·2	−0·1	—	—	—	—	A
Whitby	29·595	−·001	—	—	59·2	−0·1	−0·1	59·1	0·0	−0·1	59·0	+0·1	+0·1	—	—	—	—	—	—	A
Yarmouth	29·980	+·002	—	—	62·5	+0·1	—	62·9	−0·3	—	62·7	−0·1	—	62·1	+0·5	—	—	—	—	A
York	29·833	+·001	—	—	60·2	0·0	—	60·2	0·0	—	60·5	−0·3	—	59·9	+0·3	—	—	—	—	B
York (2nd Order)	29·833	+·001	—	—	60·2	0·0	—	60·2	0·0	—	60·0	+0·2	—	60·1	+0·1	—	—	—	—	B

POSTCRIPT.

Having had favourable opportunities of employing the small self-registering anemometers recently supplied to some of the English stations, I may be perhaps permitted to record my opinion that these instruments will prove useless, except in those rare cases in which an observer can obtain a perfect exposure to the wind. In my report for the year 1879, when experience had first forced me to become a convert to the system of personal estimation of the force of the wind, I ventured to express to the Council the grounds of the opinion I had then formed. All my subsequent experience has strengthened that opinion. Any two or more experienced observers would, I believe, at the same time and place, in a vast majority of instances, be found to agree in their estimate, and in an even larger majority of cases their estimates would be founded on the observed force of the wind in its impact upon the surface of the sea, upon foliage, sails, smoke, &c., rather than upon an instrument held in the hand, or mounted upon an indifferently-exposed wall or chimney. With stations such as the Council at present possesses, and with instruments no more perfect than those now in our hands, I believe that the rapid substitution of mechanical contrivance for eye observation may prove a serious blow to the progress and development of the whole system of weather telegraphy.

W. C. L.

Reported—That forecasts had been supplied gratis to Sir James Anderson for a short period for the use of a ship repairing the cable off Cape Finisterre (Letter 2168). Approved.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 51 logs had been received, 33 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. D. Wilson-Barker, F.R.Met. Soc.	S.S. "Buccaneer"	May 24—July 20, 1886.	Sierra Leone. Cable laying.	1885, p. 103.
Capt. James Buchan	"Coppename" -	Feb. 24—Aug. 12, 1886.	Glasgow, Surinam, Barbados, and home.	1885, p. 96.
Capt. A. Campbell -	S.S. "Circassia"	April 16—Sept. 28, 1886.	Glasgow to New York, 5 voyages.	1886, p. 14.
Capt. James Campbell	"Saint Patrick"	Aug. 19, 1885—Aug. 31, 1886.	Sunderland, Cape, Calcutta, and New York.	1885, p. 17.
Capt. H. C. Carr -	"Superb" -	Nov. 9, 1885—Aug. 11, 1886.	London to Melbourne, and home.	1885, p. 17.
Staff-Comr. E. Clapp, R.N. Log kept by H. King Sturdee, (Chief Officer).	L. H. Tender "Richmond."	Feb. 11—June 10, 1886.	At the Bahamas -	1886, p. 3.
Capt. James Clarke	S.S. "Olbers" -	March 13—Sept. 2, 1886.	Liverpool, Rio Janeiro, 2 voyages.	1885, p. 120.
Capt. W. C. Crutchley, R.N.R.	S.S. "Kaikoura"	April 10—Aug. 9, 1886.	Plymouth to New Zealand, and home.	1886, p 3.
Capt. L. C. Dart -	"Alcester" -	Nov. 30, 1885—Sept. 22, 1886.	Liverpool, Negapatam, Calcutta, and home.	1885, p. 74.
Comr. L. S. Dawson, R.N., and Lieut. H. H. Douglas, R.N.	H.M.S. "Sylvia"	May 22—Sept. 30, 1886.	Surveying N.W. Coast, Spain.	1886, p. 36.
Capt. R. Draper -	H.M. Post Office Cable Ship "Monarch."	April 26—July 16, 1886.	On Cable ground in North Sea and in Thames.	—
Capt. W. Ellery -	"Talookdar" -	Oct. 27, 1885—Sept. 1, 1886.	Liverpool, Calcutta, and home.	1885, p. 46.
Capt. T. England -	"Jane" -	Nov. 11, 1885—June 21, 1886.	Cardiff, Cape Verde, Apalachicola, Miramichi.	1885, p. 46.
Capt. B. Flinton -	"Dartmouth" -	June 23, 1885—June 24, 1886.	London, China, and home.	1885, p. 10.
Capt. James Gordon	S.S. "City of Agra."	April 21—July 26, 1886.	Liverpool, Calcutta, and home.	1886, p. 3.
Capt. David Gray -	S.S. "Eclipse"	April 22—Aug. 14, 1886.	Greenland, Whaling -	1885, p. 46.

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Comr. H. F. Hoskyn, R.N. Sub.-Lieut. F. Bowden-Smith, R.N.	H.M.S. "Myrmidon."	March 1—June 30, 1886.	Surveying on Australian Station.	1886, p. 14.
Capt. Joseph Maxwell.	"Oamaru" -	Feb. 4—Oct. 14, 1886.	London, New Zealand, and home.	1885, p. 39.
Capt. T. Mesnard -	"Sierra Miranda"	Nov. 21, 1885—Sept. 10, 1886.	Liverpool, Rangoon, and home.	1885, p. 67.
Comr. W. U. Moore, R.N. Lieut. A. Balfour, R.N.	H.M.S. "Rambler"	Jan. 1—April 30, 1886.	Surveying in China Seas	1886, p. 3.
Capt. Hy. Murdoch	"Penthesilea" -	Oct. 13, 1885—Sept. 3, 1886.	Liverpool, Bombay, and home.	1880, p. 54.
Capt. Peter Murdoch	"Sierra Estrella"	Feb. 2—Oct. 3, 1886.	Cardiff, Rangoon, and home.	1885, p. 92.
Capt. A. Murray -	"Perseverance"	July 1, 1885—Sept. 9, 1886.	Peterhead, Cumberland Gulf.	1884, p. 49.
Capt. W. G. North	S.S. "Tiger" and S.S. "Hero."	June 3—Oct. 4, 1886.	Hull to Hamburg (7 voyages). Stockholm (1 voyage).	1876, p. 93.
Capt. T. Potter -	S.S. "Sulina" -	Oct. 15, 1885—May 5, 1886.	Tyne to Sulina. Cardiff to Port Said (2 voyages).	1885, p. 47.
Capt. W. L. Rosseter	"St. Kilda" -	Feb. 22—Aug. 5, 1886.	Liverpool, Demerara, and home.	1885, p. 96.
Capt. C. J. Russell -	"Khyber" -	Oct. 11, 1885—July 25, 1886.	Liverpool, Calcutta, and home.	1885, p. 29.
Capt. W. Scott -	"Commewyne"	May 8—Sept. 4, 1886.	Glasgow, Paramaribo, and home.	1886, p. 14.
Capt. W. C. Smith -	"John R. Worcester."	April 30, 1885, Oct. 1, 1886.	London, Newcastle, (N.S.W.) India and home.	1884, p. 106.
Capt. S. Trott - Mr. R. Ladd, F.R.A.S., F.R. Met. Soc.	S.S. "Minia" -	Feb. 17—June 20, 1886.	Cable ground N. Atlantic and at Halifax.	1886, p. 3.
Capt. Hy. Walker -	"S.S. "Cephalonia."	July 23, 1885—Jan. 29, 1886.	Boston, U.S. (4 voyages)	1885, p. 40.
Capt. N. J. Wheaton	"Eliza" - -	Mar. 2—Aug. 7, 1886.	Demerara and home -	1885, p. 109.
Capt. W. Wilson -	"Horsa" -	Nov. 19, 1885—Sept. 13, 1886.	Cardiff, Colombo, Cochin, and home.	1885, p. 47.

Mr. Scott was instructed to present the Charts (O. 32) to Captain Draper, and to convey the best thanks of the Council to the other observers.

Read—Letters (1470 and 1538) from his Excellency Colonel O'Brien, Governor of Heligoland, requesting that a set of instruments should be supplied to him.

Mr. Scott was authorised to supply a set of instruments, and to inquire as to the facilities for maintaining an anemometer on the island (P.C. 2267).

Reported—That the anemometer had been erected on the high lighthouse, Dockwray Square, North Shields (Minutes, p. 39). And that the anemometer formerly at Seaham Harbour, which had been lent to the Office by Mr. L. J. Crossley (Minutes, 1872, p. 60), had been, with that gentleman's sanction (Letter 2714, 1885), erected at Fleetwood (Letter 286, 1886).

The sum of 10*l.*, as usual, was sanctioned as the annual allowance for care of each instrument.

Submitted—the following Statement respecting the Records for April 1884, received from the Self-recording Observatories (see Minutes, 21st December, 1868, and 20th November, 1876) :—

	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH :—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good.	Good
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	0	0	0	0
Orientation verified	18th	—	12th	—	8th	—	26th	—	4th	—
No. of errors discovered by examination	0	0	0	47	30	0	0	0	6	6
Results of 40 Remeasurements :—										
Greatest difference	0·0	1·0	1·0	2·0	1·0	1·0	1·0	2·0	1·0	2·0
Mean difference irrespective of sign	0·0	0·2	0·1	0·4	0·1	0·4	0·1	0·4	0·0	0·4
Residual difference (—Meteorological Office)	0·0	0·0	−0·1	+0·1	−0·1	+0·3	+0·1	0·0	0·0	+0·2
RAIN GAUGE:—										
Action	Good.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		0		0	
„ „ other causes	0		0		0		0		0	
Errors in tabulation	0		38		1		0		0	

	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH :—				
Action	Good.	Good.	Good.	Good.
Photography	Do.	Indifferent.	Do.	Fair.
Records deficient, due to stoppage of clock	0	0	1 hr.	0
„ „ failure of light	0	13 hrs.	0	3 hrs.
„ „ other causes	0	0	0	0
No. of errors discovered :—				
In entry of standards	0	2	2	0
„ calculating residual corrections	0	1	1	0
„ applying residual corrections	0	1	1	10
By examination	0	0	1	0
Results of 40 Remeasurements :—				
Greatest difference	·005	·007	·005	·006
Mean difference irrespective of sign	·002	·003	·002	·002
Residual difference (—Meteorological Office)	·000	·000	·000	·000
Mean monthly difference between simultaneous barograph and barometer readings	·002	·002	·002	·002

	Aberdeen.		Falmouth.		Kew.		Valencia.	
THERMOGRAPH :—								
Action	Good.		Good.		Good.		Good.	
Photography	Do.		Fair.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0
„ „ failure of light	0	0	0	0	0	0	0	0
„ „ imperfectly moistened bulbs	—	0	—	0	—	0	—	0
„ „ partially frozen bulbs	—	2 hrs.	—	0	—	2 hrs.	—	0
„ „ other causes	0	0	0	0	0	0	0	0
No. of errors discovered :—								
In entry of standards	0	0	2	0	0	0	0	
By examination	0	0	0	0	0	0	0	0
In maxima and minima	0	—	0	—	2	—	2	—
Results of 40 Remeasurements :—								
Greatest difference	0·2	0·2	0·1	0·3	0·3	0·3	0·3	0·2
Mean difference irrespective of sign	0·1	0·1	0·0	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	−0·1	0·0	0·0	0·0	+0·1	+0·1	+0·1	0·0
Mean monthly difference between simultaneous thermograph and thermometer readings	0·1	0·2	0·1	0·1	0·2	0·2	0·2	0·1

Submitted—The following Statement respecting the Records for May 1884, received from the Self-recording Observatories (see Minutes, 21st December, 1868, and 20th November, 1876) :—

—	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action	Good	Good	Good	Fair	Good	Good	Good	Good	Good	Good
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0
„ „ other causes	0	0	0	0	0	0	1 hr.*	1 hr.*	0	0
Orientation verified	17th	—	...	—	7th	—	12th	—	17th	—
No. of errors discovered by examination	0	0	0	20	0	0	0	0	8	7
Results of 40 *Remeasurements* :—										
Greatest difference	1·0	1·0	1·0	2·0	1·0	2·0	1·0	2·0	1·0	2·0
Mean difference irrespective of sign	0·1	0·4	0·1	0·5	0·1	0·7	0·1	0·6	0·2	0·8
Residual difference (—Meteorological Office)	+0·1	0·0	0·0	−0·1	0·0	+0·1	0·0	−0·1	+0·1	+0·1
RAIN GAUGE:—										
Action	Good.		Good.		Good.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		0		0	
„ „ other causes	0		0		0		0		0	
Errors in tabulation	0		0†		1		2		0	

—	Aberdeen.		Falmouth.		Kew.		Valencia.	
BAROGRAPH :—								
Action	Good.		Good.		Good.		Good.	
Photography	Do.		Bad.		Do.		Fair.	
Records deficient, due to stoppage of clock	0		0		5 hrs.		0	
„ „ failure of light	0		1 hr.		0		0	
„ „ other causes	0		0		0		0	
No of errors discovered :—								
In entry of standards	1		3		1		0	
„ calculating residual corrections	3		0		0		0	
„ applying residual corrections	0		21		0		0	
By examination	0		0		0		9	
Results of 40 *Remeasurements* :—								
Greatest difference	·005		·007		·007		·009	
Mean difference irrespective of sign	·002		·003		·003		·004	
Residual difference (—Meteorological Office)	+·001		−·001		·000		−·003	
Mean monthly difference between simultaneous barograph and barometer readings	·002		·001		·002		·001	
THERMOGRAPH :—								
Action	Good.		Good.		Good.		Good.	
Photography	Do.		Indifferent		Do.		Bad.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	2 hrs.	2 hrs.	0	0	2 hrs.	2 hrs.
„ „ failure of light	0	0	1 hr.	0	0	0	0	0
„ „ imperfectly moistened bulbs	—	2 hrs.	—	0	—	3 hrs.	—	0
„ „ partially frozen bulbs	—	0	—	0	—	0	—	0
„ „ other causes	0	0	3 hrs.‡	3 hrs.‡	0	0	1 hr.§ 7 hrs.¶	1 hr.§ 0
No. of errors discovered :—								
In entry of standards	0	0	0	0	0	0	0	0
By examination	0	0	0	0	0	2	0	0
In maxima and minima	0	—	0	—	3	—	0	—
Results of 40 *Remeasurements* :—								
Greatest difference	0·2	0·2	0·2	0·3	0·2	0·2	0·3	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	0·0	+0·1	0·0	+0·1	0·0	+0·1	0·0	0·0
Mean monthly difference between simultaneous thermograph and thermometer readings	0·2	0·2	0·1	0·2	0·1	0·2	0·1	0·2

* Orienting instrument, &c. † After re-tabulation at observatory, consequent upon the number of errors in the origina sheets.
‡ Cleaning and adjusting instrument. § Photographic imperfections. ¶ Neglecting to change from winter to summer zero lines.

Submitted—The following Statement respecting the Records for June 1884, received from the Self-recording Observatories (see Minutes, 21st December, 1868, and 20th November, 1876) :—

—	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH :—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action	Good.	Good.	Good.	Fair.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0	0	0
,, ,, other causes	0	0	0	0	0	0	0	0	0	0
Orientation verified	28th	—	20th	—	10th	--	10th	—	5th	—
No. of errors discovered by examination	0	0	0	2	0	0	1	0	5	1
Results of 40 *Remeasurements* :—										
Greatest difference	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	3·0
Mean difference irrespective of sign	0·1	0·4	0·1	0·3	0·1	0·3	0·1	0·4	0·1	0·7
Residual difference (—Meteorological Office)	+0·1	0·0	0·0	+0·1	+0·1	−0·1	0·0	0·0	0·0	−0·1
RAIN GAUGE :—										
Action	Good.		Fair.		Fair.		Good.		Good.	
Records deficient, due to stoppage of clock	0		0		0		0		0	
,, ,, other causes	0		0		0		0		0	
Errors in tabulation	0		0		0		4		0	

—	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH :—				
Action	Good.	Good.	Good.	Good.
Photography	Do.	Indifferent.	Do.	Do.
Records deficient, due to stoppage of clock	0	0	0	0
,, ,, failure of light	0	17 hrs.	0	0
,, ,, other causes	* 1 hr.	† 17 hrs.	0	¶ 4 hrs.
No. of errors discovered :—				
In entry of standards	0	2	1	0
,, calculating residual corrections	0	0	1	1
,, applying residual corrections	0	0	1	0
By examination	0	10	10	§27
Results of 40 *Remeasurements* :—				
Greatest difference	·005	·008	·005	·012
Mean difference irrespective of sign	·002	·003	·002	·005
Residual difference (—Meteorological Office)	—·001	+·001	·000	—·004
Mean monthly difference between simultaneous barograph and barometer readings	·002	·001	·002	·002

—	Aberdeen.		Falmouth.		Kew.		Valencia.	
THERMOGRAPH :—								
Action	Good.		Good.		‖ Good.		Good.	
Photography	Do.		Indifferent.		Do.		Indifferent.	
	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Records deficient, due to stoppage of clock	0	0	0	0	0	0	0	0
,, ,, failure of light	0	0	0	0	0	0	0	0
,, ,, imperfectly moistened bulbs	—	2 hrs.	—	0	—	2 hrs.	—	2 hrs.
,, ,, partially frozen bulbs	—	0	—	0	—	0	—	0
,, ,, other causes	1 hr.	‡1 hr. *1 hr.	0	0	0	0	0	0
No. of errors discovered :—								
In entry of standards	0	0	0	0	1	1	0	‡‡0
By examination	0	0	2	0	1	4	0	0
In maxima and minima	0	—	1	—	5	—	0	—
Results of 40 *Remeasurements* :—								
Greatest difference	0·2	0·2	0·4	0·2	0·2	0·1	0·2	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·0	0·1	0·1
Residual difference (—Meteorological Office)	0·0	+0·1	−0·1	−0·1	0·0	0·0	0·0	0·0
Mean monthly difference between simultaneous thermograph and thermometer readings	0·2	0·2	0·1	0·2	0·2	0·2	0·2	0·3

* Repairing gas pipes. † Curve torn. ¶ Photographic imperfections. § Tabulation of curves very indifferent.
‡ Water added just before the hour. ‖ From 2.0 p.m. 20th, to noon, 3rd July, the light shutter acted very imperfectly.
‡‡ 25 per cent. of wet standards rejected.

Submitted—The following statement of accounts for the six months ending 30th September 1886:—

Income.	£ s. d.	£ s. d.
Balance from year 1885–86		1,555 7 11
Proportion of vote		7,650 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	5 14 5	
(2.) Special researches	14 11 8	
		20 6 1
Supply of Weather Information:		
D.W. Charts and Forecasts	123 13 11	
6 p.m. Charts	12 10 0	
Information for Press Agencies, &c.	43 9 8	
Telegrams	204 13 3	
Miscellaneous data	5 4 6	
		389 11 4
Sale of Instruments, &c.:		
Royal Navy account	1 5 0	
Mercantile Marine account	37 12 4	
		38 17 4
Commission charged on work done for Colonies, &c.		19 17 7
		£9,674 0 3

Expenditure.	£ s. d.	£ s. d.
Administration:		
Payment of Council	500 0 0	
Secretary	400 0 0	
Salaries and wages	396 6 0	
Rent, fuel, and lighting	358 0 4	
Furniture and fittings	189 14 7	
Incidental and contingent expenses	167 13 3	
Expenses incidental to International Meteorological Congress	10 15 6	
Pensions	21 8 2	
		2,043 17 10
Special Researches		232 15 0
Land Meteorology:		
Observatories and stations	899 1 5	
Discussion and reduction of observations	663 17 4	
		1,562 18 9
Weather Information and Forecasts:		
Telegraphic reports and storm warnings	1,205 9 6	
Preparation and issue of reports and forecasts	818 3 11	
		2,023 13 5
Inspections:*		
Salaries and travelling		249 13 2
Ocean Meteorology:		
Discussion and reduction of observations	926 3 0	
Expenses incidental to the supply of instruments:		
Proportion for care and issue of instruments	100 0 0	
Royal Navy	322 13 8	
Mercantile Marine	200 19 3	
Distant island and coast stations	9 0 0	
		1,558 15 11
Balance		2,002 6 2
		£9,674 0 3

Liabilities.	£ s. d.	Assets.	£ s. d.
To Council	500 0 0	By cash at Bank	2,350 8 7
„ contracts or work uncompleted	234 17 6	„ „ at Office	74 4 2
„ Post Office (partly estimated)	105 0 0	„ „ at Valencia	50 0 0
„ sundry creditors	561 9 4	„ sundry debtors	279 0 3
„ balance	2,002 6 2	„ H.M. Exchequer	650 0 0
	£3,403 13 0		£3,403 13 0

* The proportion due for salaries is included here, but some amounts for travelling expenses are not yet brought to account.

Reported—That the following cheques had been drawn :—

For July—

1886.		£	s.	d.
July 3rd.	For weekly salaries	15	18	6
„ 7th.	H. Bond, Office fittings and repairs	52	10	6
„ „	H.M. Postmaster General, telegrams	169	6	1
„ „	Negretti & Zambra, instruments and repairs	145	3	8
„ „	R. Riviere & Son, presentation labels	2	0	0
„ „	J. H. Woodstock, packing cases	2	10	0
„ „	L. P. Casella, instruments bought on commission	23	3	6
„ 10th.	For weekly salaries	15	18	6
„ „	R. J. Lecky, instruments bought on commission	8	8	0
„ 17th.	For weekly salaries	15	18	6
„ 21st.	Malby & Sons, charts for Mr. Meldrum	11	10	0
„ „	Wightman & Co., book post wrappers, &c.	10	3	6
„ „	G. A. Gillett, wood, oil, &c.	1	5	10
„ „	Gas-Light and Coke Company, gas	4	5	3
„ „	T. De La Rue & Co., sunshine cards	4	3	0
„ „	Capt. H. Toynbee, inspections	4	13	2
„ 24th.	For weekly salaries	15	18	6
„ 31st.	R. H. Scott, Secretary	66	13	4
„ „	J. S. Harding } "Office" salaries	27	15	6
„ „	T. D. Bell } "Office" salaries	15	8	4
„ „	J. Sheerman, salary (harmonic analysis)	10	8	4
„ „	J. E. Cullum, salary (Valencia Observatory)	16	13	4
„ „	R. H. Curtis } Salaries (discussion, &c. of observations).	22	18	4
„ „	J. A. Curtis } Salaries (discussion, &c. of observations).	17	18	4
„ „	T. E. Allen } Salaries (discussion, &c. of observations).	16	13	4
„ „	C. H. Thompson } Salaries (discussion, &c. of observations).	12	1	8
„ „	S. Call } Salaries (discussion, &c. of observations).	11	5	0
„ „	E. G. Aldridge } Salaries (discussion, &c. of observations).	9	3	4
„ „	R. G. Canham } Salaries (discussion, &c. of observations).	7	1	8
„ „	A. H. Bell } Salaries (discussion, &c. of observations).	7	1	8
„ „	F. Gaster } Salaries (preparation, &c. of weather reports).	25	15	7
„ „	F. J. Brodie } Salaries (preparation, &c. of weather reports).	17	16	3
„ „	G. G. Francis } Salaries (preparation, &c. of weather reports).	17	6	10
„ „	A. J. Rigby } Salaries (preparation, &c. of weather reports).	16	17	6
„ „	R. Sargeant } Salaries (preparation, &c. of weather reports).	11	14	4
„ „	A. R. Simpkins } Salaries (preparation, &c. of weather reports).	9	16	10
„ „	H. J. Stevens } Salaries (preparation, &c. of weather reports).	8	15	0
„ „	Capt. H. Toynbee } Salaries (discussion, &c. of observations and care of instruments).	33	6	8
„ „	Nav.-Lt. C. W. Baillie, R.N. } Salaries (discussion, &c. of observations and care of instruments).	20	16	8
„ „	R. Strachan } Salaries (discussion, &c. of observations and care of instruments).	27	15	6
„ „	C. Harding } Salaries (discussion, &c. of observations and care of instruments).	22	18	4
„ „	H. Harries } Salaries (discussion, &c. of observations and care of instruments).	14	11	8
„ „	W. Allingham } Salaries (discussion, &c. of observations and care of instruments).	14	11	8
„ „	W. G. James } Salaries (discussion, &c. of observations and care of instruments).	10	16	8
„ „	F. T. Bullen } Salaries (discussion, &c. of observations and care of instruments).	9	3	4
„ „	R. F. Wallace } Salaries (discussion, &c. of observations and care of instruments).	8	6	8
„ „	W. G. Schoof, new timepiece and repairs	1	19	6
„ „	R. Meteorological Society, observations	25	0	0
„ „	H.M. Postmaster General, telegrams	103	13	9
„ „	J. J. Hicks, thermometer screens	25	8	4
„ „	L. P. Casella, instruments bought on commission	2	14	0
„ „	J. S. Harding, jun., petty cash	50	0	0
„ „	For weekly salaries	15	18	6
„ „	F. Gaster, for payment of allowances for late evening and Sunday attendance	15	13	1
		£1,254	15	4

For August— 1886.		£	s.	d.
August 7th.	R. Strachan, aneroids bought on commission	67	0	7
„ „	For weekly salaries	15	18	6
„ 14th.	„	15	18	6
„ 21st.	„	15	18	6
„ „	E. Higgs, Office repairs, &c.	23	14	4
„ „	T. De La Rue & Co., sunshine cards	15	12	6
„ „	Anglo-American Telegraph Co., telegrams	1	10	5
„ „	Postmaster-General, telegrams	93	2	4
„ 28th.	J. H. Woodstock, packing cases	3	1	0
„ „	For weekly salaries	15	18	6
„ 31st.	J. S. Harding, junr., petty cash	60	0	0
„ „	R. H. Scott, Secretary	66	13	4
„ „	J. S. Harding, jun. } "Office" salaries	27	15	6
„ „	T. D. Bell } "Office" salaries	15	8	4
„ „	J. Sheerman, salary (harmonic analysis)	10	8	4
„ „	J. E. Cullum, salary (Valencia Observatory)	16	13	4
„ „	R. H. Curtis } Salaries (discussion, &c. of observations)	22	18	4
„ „	J. A. Curtis } Salaries (discussion, &c. of observations)	17	18	4
„ „	T. E. Allen } Salaries (discussion, &c. of observations)	16	13	4
„ „	C. H. Thompson } Salaries (discussion, &c. of observations)	12	1	8
„ „	S. Call } Salaries (discussion, &c. of observations)	11	5	0
„ „	R. G. Canham } Salaries (discussion, &c. of observations)	7	1	8
„ „	A. H. Bell } Salaries (discussion, &c. of observations)	7	1	8
„ „	F. Gaster } Salaries (preparation, &c. of weather reports)	25	15	7
„ „	F. J. Brodie } Salaries (preparation, &c. of weather reports)	17	16	3
„ „	G. G. Francis } Salaries (preparation, &c. of weather reports)	17	6	10
„ „	A. J. Rigby } Salaries (preparation, &c. of weather reports)	16	17	6
„ „	R. Sargeant } Salaries (preparation, &c. of weather reports)	11	14	4
„ „	A. R. Simpkins } Salaries (preparation, &c. of weather reports)	9	16	10
„ „	H. J. Stevens } Salaries (preparation, &c. of weather reports)	8	15	0
„ „	Capt. H. Toynbee } Salaries (discussion, &c. of observations and care of instruments)	33	6	8
„ „	Nav.-Lieut. C. W. Baillie, R.N. } Salaries (discussion, &c. of observations and care of instruments)	20	16	8
„ „	R. Strachan } Salaries (discussion, &c. of observations and care of instruments)	27	15	6
„ „	C. Harding } Salaries (discussion, &c. of observations and care of instruments)	22	18	4
„ „	H. Harries } Salaries (discussion, &c. of observations and care of instruments)	14	11	8
„ „	W. Allingham } Salaries (discussion, &c. of observations and care of instruments)	14	11	8
„ „	W. G. James } Salaries (discussion, &c. of observations and care of instruments)	10	16	8
„ „	F. T. Bullen } Salaries (discussion, &c. of observations and care of instruments)	9	3	4
„ „	R. F. Wallace } Salaries (discussion, &c. of observations and care of instruments)	8	6	8
„ „	F. Gaster, for payment of allowances for late evening and Sunday attendance	17	3	0
		£840	13	5

For September— 1886.		£	s.	d.
September 4th.	For weekly salaries	15	18	6
„ 11th.	„ „	15	18	6
„ 16th.	R. H. Scott, petty cash	40	0	0
„ 18th.	For weekly salaries	15	18	6
„ 22nd.	R. H. Scott, inspections	40	0	0
„ „	Postmaster General, telegrams	176	5	9
„ „	Anglo-American Telegraph Co., telegrams	1	16	5
„ 25th.	For weekly salaries	15	18	6
„ „	Pickford & Co., carriage of parcels	2	6	7
„ 30th.	R. H. Scott, Secretary	66	13	4
„ „	J. S. Harding, jun. } "Office" salaries	27	15	6
„ „	T. D. Bell } "Office" salaries	15	8	4
„ „	J. Sheerman, salary (harmonic analysis)	10	8	4
	Carried forward	£144	8	3

				£	s.	d.
1885.		Brought forward - - -		444	8	3
September 30th.		J. E. Cullum, salary (Valencia Observatory) -		16	13	4
„	„	R. H. Curtis -	Salaries (discussion, &c. of observations).	22	18	4
„	„	J. A. Curtis -		17	18	4
„	„	T. E. Allen -		16	13	4
„	„	C. H. Thompson		12	1	8
„	„	S. Call - -		11	5	0
„	„	R. G. Canham -		7	1	8
„	„	A. H. Bell -		7	1	8
„	„	F. Gaster -	Salaries (preparation, &c. of weather reports).	25	15	7
„	„	F. J. Brodie -		17	16	3
„	„	G. G. Francis -		17	6	10
„	„	A. J. Rigby -		16	17	6
„	„	R. Sargeant -		11	14	4
„	„	A. R. Simpkins-		9	16	10
„	„	H. J. Stevens -		8	15	0
„	„	Capt. H. Toynbee	Salaries (discussion, &c. of observations, and care of instruments).	33	6	8
„	„	Nav.-Lieut. C. W. Baillie, R.N.		20	16	8
„	„	R. Strachan -		27	15	6
„	„	C. Harding -		22	18	4
„	„	H. Harries -		14	11	8
„	„	W. Allingham -		14	11	8
„	„	W. G. James -		10	16	8
„	„	F. T. Bullen -		9	3	4
„	„	R. F. Wallace -		8	6	8
„	„	G. J. Mayhew, rent - - - - -		158	15	0
„	„	J. S. Harding, senr., pension (Minutes, 1882, p. 43)		10	14	1
„	„	W. Thomas, care of Scilly anemometer - - - -	£ s. d. 1 13 0			
„	„	„ Meteorological Reports	4 18 3			
				6	11	3
„	„	H. Williams, care of bridled anemometer - - - -	2 10 6			
„	„	„ care of Robinson's anemometer -	2 11 2			
				5	1	8
„	„	C. Niven, Aberdeen - -	69 5 0			
„	„	J. L. E. Dreyer, Armagh - -	12 10 0			
„	„	W. L. Fox, Falmouth - -	62 11 0			
„	„	R. Grant, Glasgow - - -	18 15 0			
„	„	Kew Committee, allowance for quarter - - - -	100 0 0			
„	„	W. I. Fortescue, Orkney - -	2 10 0			
„	„	Rev. J. New, Stonyhurst - -	13 2 6			
„	„	J. E. Cullum, Valencia - -	42 19 0			
				321	12	6
„	„	G. T. Watson, care of Yarmouth anemometer -	3 18 0			
„	„	„ meteorological reports	4 3 0			
				8	1	0
		Carried forward - - -		£1,337	6	7

		£	s.	d.	£	s.	d.
1886.	Brought forward -	-		-	1,337	6	7
September 30th.	H. Todd, Cambridge - -	4	11	0			
„ „	H. Mohn, Christiania - -	5	10	0			
„ „	P. Curnow, Dungeness - -	4	11	6			
„ „	Rev. W. Brand, Dunrossness -	3	18	3			
„ „	W. H. Bunce, Hawes Junction -	1	19	3			
„ „	S. Richards, Holyhead - -	3	18	5			
„ „	G. G. Appleton, Hurst Castle -	3	19	1			
„ „	J. Fisher, Jersey - - -	5	0	0			
„ „	F. Gaster, London - - -	3	18	0			
„ „	W. Berridge, Loughborough -	3	5	4			
„ „	Lloyd's, for Malin Head - -	3	5	0			
„ „	K. Kerr, Mullaghmore - -	5	4	7			
„ „	A. Penny, Nairn - - -	4	6	0			
„ „	W. Wickham, Oxford - -	3	12	6			
„ „	B. Budds, Parsonstown - -	3	7	6			
„ „	J. John, Prawle Point - -	3	5	0			
„ „	S. Blake, St. Ann's Head - -	3	7	0			
„ „	J. B. Smith, Spurn Head - -	3	5	4			
„ „	D. Macdonald, Stornoway - -	5	12	6			
„ „	J. Sinclair, Wick - - -	3	5	0			
„ „	F. Guy, York - - -	3	18	0			
					82	19	3
„ „	Messageries Nationales, carriage of Fort Rae work - - -	1	15	3			
„ „	„ „ „ -	3	14	9			
					5	10	0
„ „	Wightman & Co., printing, &c. -	2	8	6			
„ „	„ book-post wrappers, &c.	7	6	6			
					9	15	0
„ „	Pall Mall Coal Co., coals - -	-		-	18	0	0
„ „	Postmaster General, private wire, „ „ Valencia -	20	15	0			
„ „	„ „ telegrams -	111	19	3			
					132	14	3
„ „	P. Adie, repairing "A" barometers	9	11	7			
„ „	„ „ "B. T." instruments	17	9	0			
„ „	„ „ barometer for Professor Mohn	3	7	6			
					30	8	1
„ „	Bank of England, barometer bought at Bombay -				6	0	4
„ „	J. H. Woodstock, packing cases -	-		-	2	11	6
„ „	J. R. Jones, Aberdeen agent -	3	4	0			
„ „	J. Fowler, Cardiff agent - -	9	16	6			
„ „	L. Allen, Dundee agent - -	3	16	7			
„ „	J. Gill, Liverpool agent - -	21	14	2			
„ „	C. H. Permain, Southampton agent	1	19	0			
					40	10	3
„ „	F. Gaster, for payment of allowances for late evening and Sunday attendances- -	-		-	16	9	3
					£ 1,682	4	6

116, *Victoria Street, November* 3, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

The Secretary was in attendance.

The Minutes of the last meeting (October 22) were read and confirmed.

Mr. Scott reported—That with reference to the stations from which it was desirable to obtain 6 p.m. reports (Minutes, p. 26), the following was the present condition of the negotiations:—

Portugal.—Reports from Lisbon received August 19, but not subsequently. A Letter No. 2,277 had been written to M. Capello on the subject.

Spain.—Reports from Corunna cannot be obtained. (M.O. 1528.)

France.—M. Mascart has not yet replied to the inquiry from the Office as to the cost of the proposed service. (M.O. 1467.)

Holland.—Report from the Helder arrives regularly. (M.O. 1539.)

Germany.—Report from Wiesbaden cannot be obtained. (M.O. 1812.)

Sweden.—Report from Stockholm is only delayed by some questions about cost of transmission. (M.O. 2180.)

Mr. Scott reported—That on the 15th ultimo, he had had a visit from Dr. Gilbert, F.R.S., who had proposed that the Weekly Weather Reports should be improved by the following additions and alterations:—

1. In the weekly "Summary of Temperature, Rainfall," &c., that the difference between the weekly value and the mean value in the corresponding part of former years should be given for each district, for—

Accumulated Heat, above 42° F.
Do. do. below 42°.
Bright Sunshine, number of hours recorded.
Do. do. percentage of possible duration.

2. In the Appendices:—

A. That the values given in Appendix II. to the Weekly Weather Report 1884 be republished in an amended form—the "Weekly" values and the "Sums" to be given in separate tables instead of in alternate columns as at present.

B. That similar tables be prepared and published for 1885 and 1886, and for each succeeding year.

C. That additional tables be published giving for each year and for each district the difference between the weekly and mean values for each of following elements:—

1. Number of days of rain.
2. Rainfall, in inches.
3. Accumulated heat, day-degrees above 42°
4. Do. do. do. below 42°.
5. Bright sunshine, number of hours recorded.
6. Do. do. percentage of possible duration.
7. Table showing mean temperature in each week for each district.
8. Do. difference between such means and the averages for a number of years.

It was resolved that—

1. In the Weekly Summary, columns should be added showing the difference between the weekly and average values for—

Accumulated Heat, day-degrees above 42°;
Do. do. do. below 42°;

but that those for Bright Sunshine should not be given at present, as the observations available for averages extend over a period too short for giving reliable values.

2. In the Appendices:—

A. That tables similar to those published in Appendix II., 1884, should be prepared and published for the years 1885 and 1886, and be continued year by year as an Appendix to the Report.

B. That the tables of mean weekly (aggregate) values for Accumulated Heat, Rainfall, and Bright Sunshine, now in use at the Meteorological Office, should be published as an Appendix to the Weekly Weather Report for 1886.

The periods covered by these tables will be:—

For Accumulated Heat - - -	8 years, viz., 1878–85.
For Rainfall - - - -	" " "
For Bright Sunshine - - -	5 years, viz., 1881–85.

That a table be prepared as soon as practicable showing for each district and for the 8 years 1878–85 the mean temperature of the air for each week; and that this table be published as an Appendix to the Weekly Weather Report for 1887.

That the above tables of Weekly Mean Temperature, Accumulated Heat, Rainfall, and Bright Sunshine be improved year by year by the addition of the values for the year then current, and that these improved tables be published regularly as an Appendix to the Weekly Report.

Submitted—The following Report:—

Report of Inspection of the Scottish Stations for 1886.

Barometers.

I did not take with me this year a mercurial standard barometer. As in previous years the aneroid No. 11 was read with the barometers of the stations, with, however, the same experience, viz., that aneroids are of little, if any use as a control instrument for inspection purposes. The result of the inspection and a comparison of the barometric readings with the isobars of the weather charts warrant me in saying that the barometers at each of the stations continue to be in excellent order.

It is gratifying to report that the difference between the inspector's and observer's, or assistant's, readings in no case exceeded 0·002 inch.

Thermometers.

In comparing the thermometers, inspector's standard thermometer No. 2,522 was first used, but this having been unfortunately broken, the standard thermometer No. 2,395 was thereafter used. The results of the comparisons made with these standards and the thermometers at the different stations and at Aberdeen Observatory are shown in the following table, the readings of the standards being corrected for instrumental errors, but the thermometers at the stations are uncorrected:—

Stations.	Standard corrected.	Station Thermometers.					Time in Water, in Minutes.	Change of Temperature of Water.	Notes.
		Dry.	Wet.	Spare.	Max.	Min.			
	°	°	°	°	°	°		°	
Laudale - -	55·2	+0·1	+0·1	—	+0·1	−0·3	90	−0·2	
Stornoway -	57·8	+0·6	+0·5	+0·3	−0·5	−0·5	100	Uniform.	
Swanbister -	59·8	0·0	+0·1	+0·4	0·0	−0·2	180	+0·2	
Dunrossness -	55·0	+0·3	+0·3	+0·2	+0·1	−0·8	135	Uniform.	
Wick - -	56·9	+0·3	+0·3	—	−0·3	−0·1	60	+0·2	
Dunrobin -	61·8	−0·4	−0·6	—	+0·5	−0·6	95	−0·2	
Nairn - -	55·1	+0 6	+0·7	+0·1	−0·2	+1·1	110	Uniform.	
Aberdeen -	53·1	+0·2	+0·4	—	+0·5	0·0	150	Do.	
Braemar - -	52·7	+0·4	+0·5	—	+0·5	−0·1	95	+0·5	
Dundee - -	53·1	+0·5	+0·5	—	+1·3	−0·2	80	Uniform.	
Pinmore - -	54·8	+0·3	+0·5	—	−0·1	0·0	45	+0·2	
Ardrossan -	53·4	+0·3	+0·4	—	0·0	−0·3	90	+0·2	
Rothesay -	55·5	−0·1	−0·1	—	+0·1	−0·4	75	Uniform.	
Glenalmond -	54·6	+0·2	+0·3	−0·2	+0·3	−0·2	85	Do.	Min., 1st, 53°·9, 2nd, 54°·4.
Leith - -	52·9	+0·1	+0·5	—	0·0	−0·4	60	Do.	
King's College -	52·0	+0·1	+0·1	—	+0·2	+0·1	80	Do.	Stevenson's screen.
Aberdeen -	52·0	−0·3	+0·3	—	+0·2	−0·3	80	Do.	Thermograph.

Hygrometers.

Readings were taken of the dry and wet-bulb thermometers immediately on opening the thermometer screens, which indicated that the instruments are kept in good order at the stations. The greatest differences, about 7°·0, occurred at Laudale, Wick, Dunrobin, and Braemar; and the smallest, about 1°·0 at Pinmore, Ardrossan, Rothesay, and Glenalmond, the weather on these occasions being close and dull.

NOTES on the STATIONS.

Laudale, August 17.—The register for the last twelve months was carefully gone over, with the result that the observations appeared to be made and entered with care. While Mr. Fletcher was making the observations on the morning of Sunday, previous to my visit, during a strong wind, a sudden gust of some violence occurred, which blew down the minimum thermometer and broke it. A new one had been ordered from London. On the same morning several large ricks of hay were blown into the sea and totally lost. All the instruments were in very good order.

Stornoway, August 23.—Annabella M'Donald, the assistant, read the instruments and made up the weather telegram correctly. The barograph is carefully attended to and works well. The Stevenson's screen and tall pole on which the sunshine recorder is placed had been re-painted the week before my visit, and all the instruments were in excellent order and well observed.

Swanbister, August 25.—This station was established in the end of 1885, in the place of the station at Sandwick, so long superintended by the late Dr. Clouston. Excellent positions have been secured for the anemometer, the thermometer screen, and the rain-gauge; and these instruments were all in very good order, and observed with much intelligence, and great interest was manifested in the work.

It deserves mention that Mr. Fortescue has adopted Dr. Clouston's idea that the servants about the house or farm may, if only the requisite time and patience be spent on their instruction, be taught to make all the observations. Mr. F., when at home, makes the observations himself, but otherwise they are made by one of the three assistants he has carefully trained. The observations of two of these assistants, the joiner and one of the housemaids, I had an opportunity of examining, and in each case the readings of the barometer and thermometer were exactly the same as my own readings.

Dunrossness, August 27–28.—Miss Brand is being trained as a second assistant at this station. All the instruments were in excellent order and well observed.

I handed over to Mr. Brand the small dial anemometer with a two-minutes sand-glass attached, designed to show from a two minutes' observation the rate of the wind's velocity per hour. Mr. B. readily understood the instrument, and during my visit numerous observations were made with it. The force of the wind during the first observation was estimated by Mr. B. at 4, and the instruments recorded a rate of 24 miles an hour, which a subsequent examination of the table, p. 58 of *Instructions in the Use of Meteorological Instruments*, showed to be a very close approximation.

A number of observations were made as to the number of seconds which elapsed as each mile-rate was recorded. The results showed the wind to be more unsteady in force than might have been supposed. On one occasion the following were the minutes which elapsed from mile to mile as marked on the dial, 14, 9, 10, 9, 9, 11, 14, 11, 7, 8 and 14, the mean being 10½ miles.

The introduction of these small anemometers would do much in bringing about comparability among these observations at the various stations: and as regards the important feature of gustiness of the wind at the time of observation, it might be taken into consideration whether that feature might not be observed, as is done at Ben Nevis and several of the continental Observatories, where the observations of wind are necessarily to a large extent estimations.

Wick, August 31.—The instruments were all in very good order, and the observations were made intelligently and with care. The barometer was read correctly by Jessie Sinclair, the assistant. With regard to the low temperatures reported at this station in July and August, an examination of observations made at the stations of the Meteorological Office and of the Scottish Meteorological Society inspected during the tour shows that low temperatures at the dates referred to were more particularly felt at stations situated between the latitudes of Inverness and the north of Orkney. Much damage was done to the potato crop and other tender plants in the Lewis, Orkney, and the counties of Sutherland and Caithness. If there be an inadvertent error of observing, it is with the recorded temperature of 30° on August 4th, which may possibly have been read for 35°, but it is to be remarked that at that time sacks left out on grass during the night were found in the early morning to be "frozen stiff."

Dunrobin, September 1.—With the exception of a slight deformation of the rain-gauge, as if the rim had been recently struck with a stone, which was easily put right, the instruments were in good order and carefully observed both by Mr. Melville and his assistant.

Nairn, September 6 and 14.—Since last inspection, Mr. Penny, the observer for many years, has died, and his daughter, Miss Penny, has been appointed successor. The instruments were in very good order, and the observations made intelligently and accurately. Miss Penny is assisted by her brother and sister, who both read the instruments correctly, and the brother can also make up with dispatch and correctness the weather telegram. Each of the sisters makes the observations independently, and compares them before making up the daily telegram. A considerable additional breadth of the wood has been cut down since last year, and the station is now, except for a narrow strip to westward, well cleared of the wood.

Aberdeen, September 24.—The rain-gauge was not quite circular, but was put right. The other instruments continued to be kept in excellent order, and observed with much intelligence by the observer and his assistants.

Braemar, September 27.—A Jordan's sunshine recorder, the gift of G. P. Wragge, Esq., Birmingham, has been added to this station since last inspection. It is very well placed to receive the sun's rays at all seasons. The instruments were in very good order and well observed by Mr. Aitken and his niece, who acts as assistant.

Dundee, September 28.—The instruments were all in good order and were observed expertly and correctly. At the time of inspection the observer estimated the wind force at 3 (scale 0 to 6), an estimation which was closely correct. The sea was then very rough with the high wind. The snapping across by violent winds of several upright sandstone monuments in the cemetery in recent years shows that the station is exposed to high winds. It is just possible, however, that force 5 and 6 may be recorded too frequently; but to this point attention will be given on future inspections. In settling the point the small anemometer referred to above would be of no small value.

Pinmore, September 30.—The instruments were in excellent order. Both Mr. Donald and his son, who assists in reading the barometer when required, were from home at the time of my visit, Mr. D. having been unexpectedly called to Girvan. The apprentice gardener, who occasionally observes the temperatures and the rainfall, read all these instruments correctly and understands their manipulation.

Ardrossan, September 30.—The thermometer screen, which is again greatly in need of painting, was ordered to be repainted and generally repaired. The other instruments were in good order and very intelligently and carefully read. The spare barometer will be removed to Mr. Mayes's new house when the height has been ascertained, the method of removing it safely being very well understood.

Rothesay, October 1.—A new pole, 47 feet high, was erected in the beginning of the year for the vane, which works quite freely. The instruments were in good order, and the observations are made with care and intelligence.

Glenalmond, October 9.—With the exception of the minimum thermometer, the instruments were in excellent order and the observations made with great accuracy. By the comparison in water it was evident that part of the spirit of the minimum thermometer was evaporated, though nothing appeared in the part of the tube open to examination. Since, however, the top of the tube was imbedded in the woodwork of the thermometer, the frame was taken to pieces and heat then applied to the top of the tube. It was thereafter placed in the water with the others being compared, and after some hours it read 0°·5 higher than before. The first reading was 53°·9 and the second 54°·4, the standard thermometer being at the same temperature throughout. During this year's inspection another minimum thermometer was detected with fully a degree of spirit which was effectually concealed beneath the brass guard of the instrument placed just under the top of the tube. Each of these constructions for the minimum thermometer is faulty, and as it cannot be expected that ordinary observers could detect the fault when it occurs, the evaporated portion of spirit being out of sight, the best course would be to reject for the stations all minimum thermometers so constructed.

Leith, October 13.—A new ventilator is required for the thermometer screen, and the screen itself needs to be painted. The other instruments were well kept, and the observations faithfully and carefully made.

The Observatory, King's College, Aberdeen, September 25.—All the instruments, both of the Observatory proper and the Stevenson's screen with the thermometers in the garden, were found to be in excellent order, and the observations made with the greatest care and with much intelligence.

ALEXANDER BUCHAN.

REPORTS on INSPECTIONS of the OBSERVATORIES, &c., 1886.

Aberdeen, visited August 17–20.—The instruments at this observatory were found carefully tended and all in good order. The barograph and thermograph had their lenses, clocks, and fittings cleaned. A new ratchet spring was fitted to the clock of the latter instrument. The thermometers were all compared both with the Kew standard No. 642, and in melting ice, and their corrections at 32° found to be as follows:—

Dry standard	−0°·6
Wet standard	0·0
Maximum M.O. No. 48	−0·5
Minimum No. 5050	−0·3

The anemograph was examined and cleaned and found to be in good order both externally and internally, with the exception of the fans of the direction vane. These are completely worn out and new ones required. I took a pattern of the worn shaft so that new fans may be supplied of the right size. The Beckley rain gauge was found to be in good order throughout, but the measuring glasses of both the Beckley and the 8-inch gauges are broken and new ones are needed.

Glasgow, visited August 27–28.—The barograph and thermograph were examined and cleaned as usual. The gas-burner of the dry-bulb thermograph was slightly varied so as to enable the zero hole of the screen to be illuminated and its image traced upon the cylinder. The thermometers were compared with the standard, and their corrections found to be as follows:—

Dry standard	−0°·1
Wet standard	−0·4
Minimum	+0·2
Maximum	+0·1

The anemograph was cleaned and examined, the screw thread on the fan shaft was found to be very much worn away and the teeth of the worm wheel much cut in places. This wheel was taken off and refitted 120° from its former position, in order to expose a new part of its circumference to the most severe wear.

The Beckley rain-gauge was in good order, and working satisfactorily.

Stonyhurst, September 4.—All the instruments were examined and found to be in good order, the action of the thermograph light-shutter was not quite satisfactory, but was improved.

The thermometers were compared and found to require the following corrections:—

Dry standard - - - -	−0°·1
Wet standard - - - -	−0·3
Maximum No. 439 - - -	−0·2
Minimum No. 501 - - -	+0·1

Radcliffe Observatory, September 11, 1886.—The instruments lent by the Meteorological Council to the Radcliffe trustees were found to be all in excellent order, but the photography was in a most unsatisfactory condition; this had been the case for some time, and I had corresponded with both Mr. Stone and the manufacturer of the waxed paper on the subject. The last supply of paper procured through the Kew Observatory, although apparently of the highest quality and very carefully prepared, has proved most unsatisfactory from a photographic point of view. It is presumed that some foreign ingredient of a deleterious nature has been introduced either into the texture of the paper or the composition of the wax, although both were procured from the best known makers. These have been applied to, but are unable to assign any reason for the failure. Mr. Stone's attention was called to the fact of the sunshine recorder not being fixed, but he preferred to have it stand as it was as its position could be verified when necessary.

The observer requested that if possible spare cylinders might be supplied for the photographic recording instruments.

The following were found to be the corrections for the various thermometers in use:—

Standard, dry bulb - - -	−0°·2
„ wet „ - - -	−0·2
Maximum, M.O. 356 - - -	−0·4
Minimum, M.O. 363 - - -	0·0
B.T. 1,710 - - -	−0·5
B.T. 1,709 - - -	−0·3

Anemographs.

Swanbister, Orkney, August 23 and 24.—This instrument, which had formerly been at Sandwick was removed to this station in December last by Mr. Boswell, of Aberdeen. Owing to the extremely inclement weather at the time, he was quite unable to give the instrument the thorough overhauling and cleaning which it required. I accordingly visited Orkney for the purpose of doing this, and having met with an intelligent workman, Alexander Ballantyne, in Kirkwall, took him with me on August 23 to Swanbister.

We found there the anemometer well placed on a low hill-top, distant about half a mile from the sea-beach, but freely exposed on all sides, with the exception of some higher hills a few miles distant to the north and west. It stands on the roof of a hut brought with it from Sandwick, but raised about 3 feet higher above the ground, the hut being built on a stone foundation of that height.

I completely dismounted the instrument, and cleaned it throughout, and had the velocity shaft straightened, as well as fitted new bearings, which I took with me, to the vane shaft. I also checked the orientation points, and the south mark of the sunshine recorder.

The observer, Mr. Fortescue, exhibits much interest in the anemometer, and rendered me great assistance.

North Shields, August 11 and August 31—September 3.—I visited this town on August 11th, and was met at the railway station by Mr. Irvine, the observer at that town, and Mr. Spence, one of the Tyne Improvement Commissioners. In the company of these gentlemen I visited the high lighthouse, where we met Mr. Cairn, the assistant engineer of the commission, with whom we discussed the placing of the anemometer on the lighthouse roof, and the necessary alterations required to the building in order to accommodate it.

I re-visited the lighthouse on August 31, when Mr. Massent, the Tyne engineer, attended with his workmen, and gave orders to proceed with the erection of the anemograph. The instrument was accordingly unpacked, hoisted to its place, put in rough adjustment, and started on September 2nd. The next day its fitting up was completed, Captain Harrison, the light keeper, and his assistant, instructed in its management, the orientation properly determined, and the instrument left in action.

The anemograph is fixed on the chimney stack, surmounting the roof of the lighthouse, two chimney pots having been removed to afford the necessary space to accommodate the anemometer column, whilst the shafts are suspended in two disused flues, the recorder being placed over the disused fireplace in the light-room. The lighthouse stands on the north edge of the bank of the Tyne, at a height of approximately 90 feet above high water, the tower being abou 60 feet high.

The anemometer cups stand at an estimated height of 150 feet above the river. The exposure is perfectly free on all sides.

Fleetwood, visited August 12.—In company with Mr. Gaulter, the town surveyor I inspected the intended site for the anemometer. I found it to be on the roof of an ornamental pavilion in the public gardens, occupying the top of a low sand hill on the sea-shore.

On my return to Fleetwood on September 6 the ornamental finial was removed from the roof, and the conical top cut down until a base sufficiently large to support the anemometer column was obtained; holes were bored down through the roofing timbers and ceiling to permit of the passage of the shafts.

The anemograph was erected in the centre of the pavilion, precautions being taken to prevent children and the numerous visitors tampering with the instrument, for as the building is used as a public refreshment room, it is frequently crowded during fine summer weather. The true south was determined by a solar observation, and a mark made on the roof for orientation of the instrument. Instructions as to changing of papers, necessary oiling, etc., was given to Messrs. Gaulter and Yeo, and the anemograph being completely adjusted) was started on September 8th.

The rough photographic sketches appended unfortunately were spoilt by an accidental exposure of the negatives to light, but will give an idea of the installations of the three anemographs.

October 1886. G. M. WHIPPLE.

DEAR SIR, Kew Observatory, November 9th, 1886.

I BEG leave to hand you herewith my report to the Meteorological Council respecting their self-recording instruments at the Falmouth and Valencia Observatories.

Falmouth.—The instruments were inspected on the following dates.

On October 11th the barograph and thermograph were examined, the clocks taken to pieces and cleaned, as well as the lenses and condensers. A good deal of stray light was observed to fall on the thermograph cylinder, thus discolouring the photographic paper; this was rectified by the re blackening of both the dry and wet tubes. After cleaning, the action of the barograph light-stop was somewhat uncertain, but this was corrected by adding a small weight to the lever of the shutter.

The photography was excellent. The standard thermometers for the control observations were compared at 50° by means of a Kew standard and the following corrections determined:—

Dry 383 $-0^{\circ}\cdot55$; Wet 388 $-0^{\circ}\cdot35$.

The maximum and minimum thermometers were in good order.

On October 14th the rain-gauge was examined, when it was found that the oil of the friction rollers had become somewhat sticky and so retarded the free action of the float. After cleaning, however, the instrument worked satisfactorily.

The clock was cleaned and a new line attached.

The anemometer was inspected on the 18th and found to be in excellent order, the bearings of all parts being well oiled and in good condition. Mr. Kitto called my attention to the brass tubing of the direction shaft which had split. This I had soldered up again.

Valencia, October 25, 26, and 27.

At the time of my visit to this observatory Mr. Cullum was absent in England.

The whole of the instruments, however, were working satisfactorily, but the usual cleaning was performed of both clocks and instruments generally.

The zero values were changed from the summer to the winter position and the standard thermometers compared at 50° with my standard, the following corrections being found to be requisite:—

Dry bulb 399	$-0^{\circ}\cdot55$;	Wet 398	$-0^{\circ}\cdot50$.
Max. 477	$-0^{\circ}\cdot3$;	Min. 2407	$-0^{\circ}\cdot1$.

The new pen recently sent out for the self-recording aneroid was attached and adjusted on the 25th, and during my stay the instrument worked well.

On October 26th the electrical and recording parts of the mountain anemometer were erected by kind permission of the Anglo-American Telegraph Company in their workshop at the telegraph station. Mr. Graves, the Superintendent, most kindly gave me every assistance, and placed a number of batteries at my disposal.

After the various connections had been joined up, both velocity and direction gear acted perfectly.

The working of the apparatus was explained to Mr. Windler, the mechanician, who now thoroughly understands all the details.

Fuller's mercury-bichromate batteries are now entirely used by the Telegraph Company and are well adapted for the electrical anemometer, as their strength is nearly double that of either Daniell's or Leclanché cells, they also maintain their power for a greater length of time.

It was found by experiment that four of these cells were sufficient to work the direction apparatus on short circuit and 10 for the velocity, whilst 10 others were required for the relay, making 24 in all to work the instrument.

It was, however, suggested by Mr. Windler that the following apparatus should be obtained in case of breakage, &c.:—

40 quart jars.
60 porous cells.
100 zincs (5 inches in length).
100 carbons.
1 jar of bichromate (size about ½ gallon).
2 gallons sulphuric acid.
10 lbs. of mercury.

The approximate original cost of the above would be about 12*l.*, but after this first outlay the cost of chemicals yearly would be very trifling.

The address of the firm supplying the above batteries recommended by Mr. Graves is Messrs. Fuller and Son, Newcastle Wharf Works, 547, Old Ford Road, Bow, E.

About 200 yards of single covered wire No. 18 would be required, unless the Post Office make all connections besides laying down the two wires.

T. W. BAKER.

R. H. Scott, Esq., F.R.S.

Submitted—The following report on the forecasts for October 1885:—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

OCTOBER, 1885.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	42	35	39	77
,,	b	42	35	38	
,,	c	16	15	16	
,,	d	0	15	7	
SCOTLAND, E.	a	42	50	46	77
,,	b	35	27	31	
,,	c	19	8	14	
,,	d	4	15	9	
ENGLAND, N.E.	a	50	46	48	77
,,	b	27	31	29	
,,	c	19	4	12	
,,	d	4	19	11	
ENGLAND, E.	a	54	31	43	72
,,	b	27	31	29	
,,	c	12	7	9	
,,	d	7	31	19	
MIDLAND COS.	a	42	35	39	68
,,	b	39	19	29	
,,	c	19	15	17	
,,	d	0	31	15	
ENGLAND, S.	a	42	54	48	75
,,	b	39	15	27	
,,	c	19	12	16	
,,	d	0	19	9	
SCOTLAND, W.	a	31	38	35	69
,,	b	38	31	34	
,,	c	19	12	16	
,,	d	12	19	15	
ENGLAND, N.W.	a	35	50	43	62
,,	b	23	15	19	
,,	c	27	12	19	
,,	d	15	23	19	
ENGLAND, S.W.	a	19	58	39	68
,,	b	39	19	29	
,,	c	27	8	17	
,,	d	15	15	15	
IRELAND, N.	a	39	58	49	74
,,	b	23	27	25	
,,	c	19	11	15	
,,	d	19	4	11	
IRELAND, S.	a	23	58	41	72
,,	b	35	27	31	
,,	c	15	11	13	
,,	d	27	4	15	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	42	36	39	75
,,	b	39	32	36	
,,	c	16	19	17	
,,	d	3	13	8	
SCOTLAND, E.	a	42	42	42	70
,,	b	32	28	28	
,,	c	23	16	19	
,,	d	3	19	11	
ENGLAND, N.E.	a	39	48	44	76
,,	b	39	26	32	
	c	22	13	18	
	d	0	13	6	
ENGLAND, E.	a	49	32	41	68
,	b	26	29	27	
,,	c	19	13	16	
,,	d	6	26	16	
MIDLAND COS.	a	52	36	44	73
,,	b	19	39	29	
,,	c	26	6	16	
,,	d	3	19	11	
ENGLAND, S.	a	55	29	42	76
,,	b	26	42	34	
,,	c	16	16	16	
,,	d	3	13	8	
SCOTLAND, W.	a	29	30	30	69
,,	b	35	43	39	
,,	c	26	10	18	
,,	d	10	17	13	
ENGLAND, N.W.	a	42	64	53	74
,,	b	29	13	21	
,,	c	19	13	16	
,,	d	10	10	10	
ENGLAND, S.W.	a	39	37	38	68
,,	b	26	33	30	
,,	c	29	10	19	
,,	d	6	20	13	
IRELAND, N.	a	29	58	44	76
,,	b	39	26	32	
,,	c	19	10	15	
,,	d	13	6	9	
IRELAND, S.	a	39	58	49	75
,,	b	26	26	26	
,,	c	22	10	16	
,,	d	13	6	9	

SUMMARY.

BRITISH ISLES	a	38	47	43	72
,,	b	34	25	29	
,,	c	19	10	15	
,,	d	9	18	13	

BRITISH ISLES	a	42	43	43	73
,,	b	30	30	30	
,,	c	22	12	17	
,,	d	6	15	10	

With reference to the vacancy on the staff caused by Mr. Aldridge's resignation (Minutes, p. 45), it was resolved that an examination be held of the candidates approved by the Chairman and Secretary, and that the results be reported to the Council.

Read—A memorandum from Captain Toynbee reporting that since the last meeting six logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. V. Graham	"Majestic" -	Dec. 18, 1885—Oct. 3, 1886.	To and from Calcutta -	1885, p. 46.
Capt. J. F. L. P. Maclear, R.N. Lieut. W. O. Lyne, R.N.	H.M.S. "Flying Fish."	March 10—July 11, 1886.	Surveying China Sea -	1886, p. 23.
Commr. W. U. Moore, R.N. Lieut. A. F. Balfour, R.N.	H.M.S. "Rambler."	May 1—Sept. 1, 1886.	Surveying Chusan Archipelago.	1886, p. 65.
Capt. H. Trunks -	Barque "Aldborough."	Nov. 11, 1885—Sept. 14, 1886.	Cardiff, Bombay, home.	—

Mr. Scott was instructed to present the Charts (O. 27) to Captain Trunks, and to convey the best thanks of the Council to the other observers.

Submitted the following statements of work for the month of October 1886: —

MARINE ROOM.

November 2, 1886.

Examined 12 new logs and 1 lighthouse register.

North Atlantic Weather Charts.

The charts to the end of April 1883 prepared for eidographing and the reduction of March completed.

Proofs of lithographed charts received to the beginning of January 1883, and seven sheets passed for press

The female clerks reducing the charts and preparing them for the lithographer.

General.

Discussion of Red Sea data from Office, Dutch, and P. and O. logs.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

(Four months ending October 31, 1886.)

Monthly Weather Report, 1886:—

April, *May*, and *June* completed and published.

July, in proof; *August* and *September*, tables and some of charts prepared in rough.

Weekly Weather Report.—Complete and published to date; Second and Third Quarterly Summaries also published.

Daily Weather Report.—Published to date.

Checking Daily Forecast Signals (3.30 p.m. and 8.30 p.m.).—Done to date (summaries for July, August, and September have already been handed in, that for October is nearly ready).

Proposal for sending daily Atlantic Weather Telegrams from United States.—Carefully examined, and revised plan for *Storm Telegrams* prepared.

Gales prevalent on Coasts of British Islands (for Admiralty) —Completed. Several tables re-copied and forwarded to Admiralty.

Preparation of Means of Dry and Wet-bulb Temperatures for 8 a.m. at all telegraph stations, for five years, 1881-85, and incorporation of the values with those of the previous ten years.—Completed.

Preparation of Means of Daily Maximum and Minimum Temperature at all Weekly Weather Report Stations for five years 1881-85, and incorporation of same (as far as possible) with those for previous nine years.—About half done.

Quarterly Weather Report, 1878.—Tables of Mean Values for Telegraphic Reporting Stations, for April to September.—Completed.

Hay Harvest Forecasts, 1886, issued, and returns received ready for checking same.

Inspection Notes, 1866, prepared, received, and examined. Irish and English Inspectors have attended and given additional verbal information.

During this interval the bulk of the holidays have been taken.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

November 1, 1886.

Observatory Returns.—Hourly Readings, 1884, Part I., revised and signed for press. Part II. proof received for first half of April, but not yet read; means and hourly vapour tension values calculated, and readings copied for printer, to end of May. The vapour tension values and some of the means for one station for half a month had to be re-worked, owing to an error. Part IV. 1883, Appendix. An introduction has been prepared, and the tables have been further revised.

Quarterly Weather Report.—The letter-press of Part II., 1878, has not been much advanced. Part III., the chart plates are nearly half done.

Harmonic Analyser.—The analysis of the barograms, 1875, has been carried out for five of the seven observatories.

Miscellaneous.—Comparison of Mr. Bayard's calculated results with harmonic analyser results; Inspector's notes and examination of sunshine returns; preparation of forms required for analyser results, &c.

(Signed) R. H. CURTIS.

R. H Scott, Esq., F.R.S.

EXAMINATION ROOM.

SIR, November 1, 1886.

THE following is a report of the work done during the month of October.

EXAMINATIONS.

June 1884:—Three *thermograms*, three *barograms*, and five *anemograms*.
October 1885 to *February* 1886:—One *thermogram* and one *barogram*.
Weekly examinations, on receipt, of curves and documents from all stations.

REPORTS, &c.

Notes of Errors to Aberdeen, Armagh (anemogram), Falmouth, Kew (anemogram), and Valencia, for *June* 1884, and report thereon to Council.

I am, &c.

R. H. Scott, Esq., F.R.S.
Secretary, Meteorological Council.

(Signed) T. E. ALLEN.

116, *Victoria Street, November* 17, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (November 3) were read and confirmed.

With reference to the subject of the degree of minuteness to which barometers should be read, it was resolved:—

That, excepting in the case of the standard barometers used at the principal observatories, the readings shall be made directly from the graduations of the verniers, without attempting to estimate smaller quantities.

That the verniers of the marine barometers belonging to the Office, and those used at ordinary stations, be altered gradually, as they come in for repairs, so as to read to 0·005 in. instead of 0·002 in., as at present.

That the register of individual observations be printed to hundredths thousandths being only given in the case of means.

Read—A letter (No. 2284) from Mr. Meldrum, suggesting that the Office should endeavour to prepare synoptic charts of the Indian Ocean for the period from May 25 to June 15, 1885, inclusive, the time at which a serious cyclone occurred in the Gulf of Aden.

Mr. Scott was instructed to report as to the feasibility of carrying out the proposal, and to inquire what materials Mr. Blanford possessed for the charts.

Read—The following letter:—

(M.O. 2481.) Somerleyton Rectory, Lowestoft,
November 16, 1886.

SIR,

WITH your permission I should like to suggest to the Council of the Meteorological Office that in addition to the observations at present being taken on light-vessels, of the temperature of the air and of the surface of the sea, the temperature of the bottom of the sea should be observed on certain light vessels, such as those I will presently venture to suggest.

Such observations on the temperature of the bottom of the sea would be of value to the man of science and to the commercial fishing interest of Great Britain.

The flow of water from the Atlantic striking the Lands End is parted into two streams, one flowing northward up Saint George's Channel, the other flowing eastward up the English Channel and thence northward into the North Sea. The temperature observations published in the Meteorological Atlas present very interesting results as far as surface temperatures go, but observations of the temperature of the bottom would not only make the present series of observations more complete and therefore more valuable, but throw light upon some points on which we have at present little or no data from which to form correct judgments of the effect of these currents.

The North Sea is so valuable a fishing ground, so much capital and so many livelihoods depend on its production of fish that any observations tending to increase our knowledge of fish life, assume to my mind a national interest, and there are other fishing grounds not so extensive, but of great local value, which would be served by the observations I suggest. In making these remarks I am aware that the Meteorological Office does not concern itself with the fishing interests, but I make them to show how such observations would serve a double purpose.

The light-vessels I would suggest on which these bottom temperature observations should be made are the "Sevenstones," the "Royal Sovereign," the "Galloper," the "Outer Dowsing," the 'Dudgeon," the "Cardigan Bay," the "Kish," and the "Bahama Bank." These eight light-vessels would show whether the variation of the temperature of the bottom of the sea follows that of the surface.

I am aware that an objection may be made to this suggestion on the score of the irregularity in taking the observations. I may perhaps be allowed to say that I have for the last 12 months been superintending sea temperature observations in the North Sea and on the coast of Mull, so that I am not altogether an inexperienced theorist, and am fully alive to the inconvenience caused by breakages. The plan I have adopted in using the Miller-Casella thermometer seems to obviate in some measure the danger of breaking it on the bottom: and if each light-vessel was furnished with two thermometers, there would be a spare one in case of a mishap.

I have for some time desired to make this suggestion to the Council, but I delayed doing so till I had gained some practical experience of the work and its difficulties. I cannot think the difficulties insuperable; and I submit that the work is worthy of the consideration of the Council.

I am, &c.

(Signed) CHARLES J. STEWARD, M.A. F.R.Met.S.

R. H. Scott, Esq.

Reported—That an application had been received from the Board of Trade (Letter 2423), for a statement as to the warnings issued by the Office for the gale of October 15, and that in reply a copy of the memorandum printed Minutes, p. 52, had been forwarded (P.C. 2392).

Read—Letter 2448, from the Foreign Office, conveying a request from the Japanese Minister for an exchange of publications with the Imperial Naval Observatory at Tokio.—Sanctioned (P.C. 2465).

Submitted—The following memoranda:—

MATERIALS for preparing ESTIMATES for the year 1887–88.

	Data for framing Estimates.	Estimated Expenditure for 1887–88.	Proposed for for 1887–88.	Proposed for 1886–87.
Administration:	£	£	£	£
(1.) Council	- -	1,000	1,000	1,000
(2.) Secretary	- -	800	800	800
(3.) Salaries:—*	- -	802	800	800
Chief Clerk	333			
1 Junior Clerk	190			
2 Boys	100			
Office Keeper	109			
Messenger	65			
	797			
There will be probably an increase in the pay of one of the two boys.				
(4.) Rent, fuel, and lighting	- -	732	730	700
Payments for one year ending 30th Sept. 1886:—				
Rent	635			
Fuel	69			
Gas	28			
	732			
(5.) Incidental and contingent expenses	- -	520	500	450
Payments for one year ending 30th Sept. 1886:—				
Office Keeper's contingent account, including porter's allowance for cleaning, &c.	202			
Postage	75			
Furniture and Office repairs	175			
Carriage of parcels, &c.	19			
Stationery Office: Annual Reports and sale of forms	38			
Copying synchronous observations	11			
Books	14			
International meteorology	11			
Sundries	22			
	567			
Deduct repayments under this head, including "Commission"	48			
	519			
The charges under furniture, &c. are higher than usual this year.				
(6.) Pensions	- -	43	40	40
Mr. J. S. Harding, senr.				
Special Researches and Experiments	- -	1,000	1,000	1,000
*Salaries:—				
Harmonic analysis (Mr. Sheerman)	*130			
Atlantic synchronous work (female staff)	247			
Other payments for one year ending 30th September 1886:—				
Bridled anemometer (Holyhead)	10			
Scilly anemometer	7			
Clouds	117			
Instruments	29			
Sunshine cards	35			
Ben Nevis Observatory	†100			
U. S. telegrams	†25			
Sundries	11			
	711			
Deduct repayments under this head	30			
	681			
The amount under this head is, as usual, put at 1,000*l.*, without regard to expenditure.				
† The payments for U. S. reports and allowance to Ben Nevis Observatory are included under Telegraphy from 1st April 1886.				
Carried forward	- -	4,897	4,870	4,790

* Increments specified in Minutes of 1884–5, pp. 118–119, allowed for.

	Data for framing Estimates.	Estimated Expenditure for 1887-88.	Proposed for 1887-88.	Proposed for 1886-87.
	£	£	£	£
Brought forward - - -	- -	4,897	4,870	4,790
Land Meteorology:				
(1.) Observatories and stations - - - -	- -	1,818	1,800	1,760
(Allowances and other payments for one year ending 30th Sept. 1886):—				
Aberdeen - - - - - -	291			
Armagh - - - - - -	52			
Falmouth - - - - - -	308			
Glasgow - - - - - -	56			
Kew - - - - - -	421			
Stonyhurst - - - - -	56			
Valencia (including rent) - - - -	437			
Four anemograph stations - - -	42			
Observations supplied by Meteorological Societies -	137			
Instruments - - - - -	61			
Sundries - - - - - -	7			
	1,868			
The charge for instruments will perhaps be small. Deduct, say - - - - - -	50			
	1,818			
(2.) *Salaries:—Discussion and reduction of observations -	- -	1,290	1,320	1,380
2 Senior Clerks - - - -	495			
5 Junior Clerks - - - -	670			
3 Boys - - - - - -	114			
	1,279			
This list includes the late Pantagraph Branch, now engaged on the Quarterly Weather Report, and the Computation and Examination Branches. There will be probably an increase in the pay of the boys. The vacancy caused by the resignation of Mr. Aldridge has not yet been filled up.				
Weather Information and Forecasts - - - -	- -	2,305	2,350	2,400
(1.) Telegraphic reports and storm warnings:				
Payments for one year ending 30th September 1886:—				
Reports to Meteorological Office - -	709			
Reports sent abroad - - - -	581			
Storm warnings - - - -	427			
Hay harvest forecasts - - - -	44			
Private wires - - - -	91			
Payments to reporters, &c. - - -	716			
Reports to Jersey - - - -	36			
Sundry telegrams, forecasts, &c. - -	14			
Postage of charts and incidental expenses -	231			
Instruments, screens, &c. - - -	40			
Synoptic charts - - - -	38			
Wrappers, printing, &c. - - -	32			
U. S. telegrams (6 months) - - -	13			
Sundries - - - - -	19			
	2,991			
Repayments during the same period - - -	686			
	2,305			
These amounts contain 13 monthly payments to the Post Office, and there will probably be a reduction of the charges for instruments, but these deductions amounting to about 150*l.* will be counterbalanced by the allowance to Ben Nevis Observatory and the payments for U. S. telegrams now being included under this head.				
Carried forward - - -	- -	10,310	10,340	10,330

* Increments specified in Minutes of 1884-5, pp. 118-119, allowed for.

	Data for framing Estimates.	Estimated Expenditure for 1887–88.	Proposed for 1887–88.	Proposed for 1886–87.
	£	£	£	£
Brought forward	- -	10,310	10,340	10,330
(2.) *Salaries:—Preparation and issue of reports and forecasts	- -	1,670	1,670	1,650
1 Senior Clerk (9 hours daily)	309			
6 Junior Clerks (5 work 9 hours daily)	1,021			
2 Boys	86			
1 Messenger	55			
Addition for late evening and Sunday attendance. The payments for this, for one year ending 30th Sept. 1886, were	195			
	1,666			
There will probably be an increase in the pay of the boys.				
Inspections	- -	550	550	550
Salaries of Messrs. Buchan and Ley	300			
Travelling Charges for year 1886:				
Mr. Baker	16			
Mr. Buchan	43			
Mr. Gaster	1			
Mr Ley	61			
Mr. Scott	52			
Captain Toynbee	5			
Mr. Whipple	47			
Contribution to Royal Meteorological Society	25			
	550			
Ocean Meteorology:				
(1.) Salaries:—Discussion and reduction of observations	- -	1,872	1,870	1,850
Marine Superintendent	400			
Assistant „	250			
1 Senior Clerk (in charge of instruments)	333			
1 „ „ („ Marine Rooms)	275			
5 Junior Clerks	*710			
2 Temporary Clerks	104			
	2,072			
Deduct proportion chargeable to care and issue of instruments (say)	200			
	1,872			
(2.) Salaries:—Proportion chargeable to care and issue of instruments	- -	200	200	200
(3.) Supply of instruments to the Royal Navy	- -	300	300	300
Payments for one year ending 30th Sept. 1886:—				
Instruments, repairs, &c.	307			
Verifications	34			
[Receipts during same period 8*l.*]	341			
(4.) Supply of instruments, &c. to Mercantile Marine	- -	378	350	400
Payments for one year ending 30th Sept. 1885:—				
Instruments and repairs	196			
Verifications	21			
Agents fees, &c.	186			
Packing cases	14			
Presentation labels	5			
Sundries	2			
[Receipts during the same period 51*l.*]	424			
There is not much regularity about charges for instruments. The estimated expenditure under the preceding heads is taken as the mean of the last two years ending 30th Sept. 1886.				
(5.) Distant island or coast stations	- -	20	20	20
The only regular payments under this head are for care of anemometer at Bermuda, 18*l.* 5*s.* 0*d.* a year.				
Totals	- - £	15,300	15,300	15,300

* Increments specified in Minutes of 1884–5, pp. 118–19, allowed for.

The actual expense, estimated as closely as possible from the previous year and making allowance for possible changes, is as nearly as possible 15,300*l.* This leaves the sum for special researches at the full amount of 1,000*l.* and some little margin under some other heads.

SYNOPSIS of OFFICE SALARIES.

Service.	1887-88.	1886-87.	1887-88. Increase.	1887-88. Decrease.
	£	£	£	£
Administration	1,598	1,580	18	—
Special Researches	377	359	18	—
Land Meteorology	1,279	1,364	—	85
Weather Information	1,667	1,635	32	—
Ocean Meteorology	2,072	2,052	20	—
Totals £	6,993	6,990	88	85

In the above statement the payment of 1,000*l.* to the Council is not included.

The amounts stated are the salaries authorised by Minutes of 1884, pp. 118-19, for the respective years, with the addition of an approximate amount for late evening and Sunday attendance.

[J. S. H.]

METEOROLOGICAL OFFICE. ESTIMATES for the Year 1887-88.

Heads of Service.	Proposed for 1887-88.		Proposed for 1886-87.		1887-88. Increase.	1887-88. Decrease.
Administration:	£	£	£	£	£	£
Payment of Council	1,000		1,000			
Secretary	800		800			
Salaries and wages	800		800			
Rent, fuel, and lighting	730		700			
Incidental and contingent expenses	500		450			
Pensions	40		40			
		3,870		3,790	80	—
Special Researches and Experiments	- -	1,000	- -	1,000		
Land Meteorology:						
Observatories and stations	1,800		1,760			
Discussion and reduction of observations	1,320		1,380			
		3,120		3,140	- -	20
Weather Information and Forecasts:						
Telegraphic reports and storm warnings	2,350		2,400			
Preparation and issue of reports and forecasts	1,670		1,650			
		4,020		4,050	- -	30
Inspections:						
Salaries and travelling expenses	- -	550	- -	550	—	—
Ocean Meteorology:						
Discussion and reduction of observations	1,870		1,850			
Expenses incidental to the supply of instruments:						
Care and issue of instruments	200		200			
Royal Navy	300		300			
Mercantile Marine	350		400			
Distant islands (and coast) stations	20		20			
		2,740		2,770	- -	30
Totals £	- -	15,300	- -	15,300	80	80

[R. S.]

The estimates were approved, and the Secretary was instructed to forward a copy to the Treasury (P.C. 2566).

Submitted—A letter (No. 2606) from Mr. Baillie, asking for an increase of his salary to 275*l.* per annum.

Resolved.—That the increase be granted as requested, to date from January 1887.

Submitted—A proof of the Report of the International Meteorological Committee, Paris Meeting.

Read—A memorandum from Captain Toynbee, reporting that since the last meeting 10 logs had been received, 9 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. A. W. Adamson. Mr. H. M. Lambert, R.N.R. (2nd officer).	S.S. "Brindisi"	July 8—Nov. 6, 1886.	London, China, and home	1886, p. 48.
Capt. G. A. Chaddock.	Barque "Elissa"	March 7—Oct. 13, 1886.	Newport, Paysandu, Galveston, and Pensacola.	—
Capt. R. Draper -	Post Office Cable Ship "Monarch."	July 23—Oct. 29, 1886.	Cable repairing, British Islands.	1886, p. 64.
Capt. J. Ivor Dunbar.	S.S. "Arracan"	July 10—Oct. 30, 1886.	Rangoon and home, viâ Suez.	1886, p. 23.
Capt. John W. King	S.S. "Philomene."	Oct. 21, 1885—Nov. 1, 1886.	New York, Calcutta, and home.	—
Capt. W. F. Milne -	S.S. "Esquimaux."	Feb. 12—Oct. 20, 1886.	Dundee, Newfoundland, Davis Strait, and home.	1885, p. 67.
Capt. F. Norman -	Barque "Polestar."	Jan. 17—Oct. 6, 1886.	Liverpool, Valparaiso, and home.	1885, p. 47.
Capt. S. Trott - Mr. R. Ladd, F.R.A.S., &c., Navigating Officer.	S.S. "Minia" -	June 21—Oct. 30, 1886.	American Cable Ground and Halifax.	1886, p. 65.
Capt. H. Youlden -	Barque "Mary Hulse."	Dec. 9, 1885—Oct. 31, 1886.	Newcastle, Buenos Ayres, Talcahuano, Coquimbo, and home.	1885, p. 67.

Mr. Scott was instructed to present the charts (O. 27) to Captain King, (O. 32) to Captain Chaddock, and to convey the best thanks of the Council to the other observers.

Reported—That the following cheques had been drawn during the month of October:—

1886.		£	s.	d.
Oct. 2nd.	For weekly salaries - - - - - -	15	18	6
,, 9th.	,, - - - - - -	15	18	6
,, 16th.	,, - - - - - -	15	18	6
,, ,,	Hopkin and Williams, chemicals - - - -	1	8	7
,, ,,	Johnson, Matthey, & Co. ,, - - - -	2	11	4
,, ,,	Royal Meteorological Society, observations - - -	25	0	0
,, ,,	Kew Committee, verifications - - - -	36	4	3
,, ,,	Anglo-American Telegraph Company, telegrams - -	1	1	0
,, ,,	D. McGregor & Co., Glasgow agents - - -	5	8	2
,, ,,	R. H. Scott, inspections - - - - -	12	0	3
,, 23rd.	Gas Light and Coke Company, gas - - - -	3	5	0
,, ,,	H. Bond, Office repairs - - - - -	61	13	3
,, ,,	Postmaster General, fee for abbreviated address - -	1	1	0
,, ,,	A. Buchan, inspections - - - - -	42	17	7
,, ,,	W. C. Ley ,, - - - - - -	31	8	5
,, ,,	G. M. Whipple ,, - - - - -	46	13	8
,, ,,	Negretti and Zambra, instruments - - - -	132	14	9
,, ,,	For weekly salaries - - - - - -	15	18	6
,, ,,	J. Green, care of Bermuda anemometer - - -	4	11	0
,, 30th.	For weekly salaries - - - - - -	15	18	6
,, ,,	R. H. Scott, Secretary - - - - -	66	13	4
,, ,,	J. S. Harding, junr. - - } "Office" Salaries	27	15	6
,, ,,	T. D. Bell - - - }	15	8	4
	Carried forward - -	£597	7	11

1886.			£	s.	d.
		Brought forward - - -	597	7	11
Oct. 30th.	J. Sheerman, salary, harmonic analysis - - -		10	8	4
„ „	J. E. Cullum, salary, Valencia observatory - - -		16	13	4
„ „	R. H. Curtis - - -	Salaries (Discussion, &c. of Observations).	22	18	4
„ „	J. A. Curtis - - -		17	18	4
„ „	T. E. Allen - - -		16	13	4
„ „	C. H. Thompson - -		12	1	8
„ „	S. Call - - - -		11	5	0
„ „	R. G. Canham - - -		7	1	8
„ „	A. H. Bell - - -		7	1	8
„ „	F. Gaster - - -	Salaries (Preparation, &c. of Weather Reports).	25	15	7
„ „	F. J. Brodie - - -		17	16	3
„ „	G. G. Francis - - -		17	6	10
„ „	A. J. Rigby - - -		16	17	6
„ „	R. Sargeant - - -		11	14	4
„ „	A. R. Simpkins - - -		9	16	10
„ „	H. J. Stevens - - -		8	15	0
„ „	Capt. H. Toynbee - -	Salaries (Discussion, &c. of Observations, and care of Instruments).	33	6	8
„ „	Nav.-Lt. C. W. Baillie, R.N. -		20	16	8
„ „	R. Strachan - - -		27	15	6
„ „	C. Harding - - -		22	18	4
„ „	H. Harries - - -		14	11	8
„ „	W. Allingham - - -		14	11	8
„ „	W. G. James - - -		10	16	8
„ „	F. T. Bullen - - -		9	3	4
„ „	R. F. Wallace - - -		8	6	8
„ „	G. A. Gillett, rent, fuel, &c. - - - -		1	7	8
„ „	M. S. Gaulter, erection of Fleetwood anemometer - -		9	18	1
„ „	W. C. Ley, salary (6 months) - - - -		75	0	0
„ „	J. S. Harding, jun., petty cash - - - -		50	0	0
„ „	F. Gaster, for payment of allowances for late evening and Sunday attendance - - - - - -		17	0	6
			£1,143	5	4

116, *Victoria Street, December* 1, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (November 17) were read and confirmed.

Mr. Buchan was present, by invitation, and furnished the Council with some further particulars as to his recent inspection (Minutes, p. 75).

It was resolved (M.O. 2605) to request Mr. Buchan (P.C. 2582) to furnish reports from the following stations for the Weekly Weather Report, so as to improve the existing information regarding Scotland in that publication:—

Lairg - -	- Sutherlandshire.
Glen Carron -	- Ross-shire.
Fort Augustus	- Inverness-shire.
Braemar -	- Aberdeenshire.
Ochtertyre -	- Perthshire.
Marchmont -	- Berwickshire.
Glenlee -	- Kirkcudbrightshire.

Mr. Scott reported, with reference to the proposed erection of the electrical anemograph at Valencia (Minutes, pp. 42 and 59), that on his recent visit to Valencia he had inspected and selected a site for the instrument on Kilbeg Hill. He had taken the most important portions of the mechanical apparatus with him to Valencia, and had explained their use to Mr. Windeler, the mechanician to the Anglo-American Company, at their station on the island, who had expressed his willingness to look after the electrical arrangements if he could obtain permission from the superintendent of the station. He, Mr. Scott, had requested the acting superintendent to state if such permission could be granted, and the subjoined letter had been lately received:—

ELECTRICAL ANEMOMETER FOR VALENCIA METEOROLOGICAL STATION.

(M.O. 2442.) The Anglo-American Telegraph Company, Limited.

DEAR SIR, Valencia, November 10th, 1886.

THE above subject has been under the consideration of our officials.

It is understood that the Meteorological Department will have the whole apparatus put up in working order, and will supply all battery and other materials for maintaining it in working order.

This Company is disposed to grant the services of Mr. H. Windeler, their mechanician at this station, to look to the apparatus and keep it in electrical and mechanical going order for the first year for the sum of ten pounds.

If at the end of that period the attention required is proved to be greater than at present foreseen the amount can be revised in proportion.

I am, &c.

R. H. Scott, Esq., F.R.S., (Signed) JAMES GRAVES,
Meteorological Office, 116, Victoria Street, London. S.W. Superintendent.

Mr. Scott stated that with reference to wayleave and rental for the site, he had had an interview with the Knight of Kerry in London on October 15th, and had recently received a letter (No. 2,523), in which the Knight had proposed a rent of 5*l.* annually.

It was resolved that this proposal be accepted, rent to commence January 1, 1887.

Mr. Scott was instructed to have the instrument erected, and worked for 12 months, and arrange with the Post Office accordingly. (P.C. 2573.)

Mr. Scott reported, with reference to the stations from which he had endeavoured to obtain reports at 6 p.m. (Minutes, p. 74), as follows:

Lisbon.—Letter received November 16 (M.O. 2467) explaining that owing to difference of longitude and unavoidable delays in transmission, reports for 6 p.m. could not be received in London much before 9 p.m.

In his reply (P.C. 2469) Mr. Scott had requested M. Capello to organise, if possible, observations at 4h. 30m. or 5h. p.m.

Paris.—M. Mascart had explained (M.O. 2506) that, as the English postal authorities would not grant any reduction on the telegraphic charges, the entire cost of the telegrams would fall on the Meteorological Office.

Mr. Scott's action with regard to Lisbon was approved, and he was instructed to request M. Mascart to state the estimated cost of the service, with a view of instituting it for a year on trial. (P.C. 2561.)

Mr. Scott stated that the telegraphic service from the Chief Signal Office, Washington, relating to weather over the United States (Minutes, p. 41), had commenced on the 18th ultimo. Some details of the service required to be adjusted.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 11 logs had been received, 9 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. D. Wilson-Barker, F.R. Met. Soc.	S.S. "International."	Aug. 12—Nov. 16, 1886.	Cable work, Key West -	1886, p. 64.
Capt. Brabazon, J. Barlow, R.N.R.	S.S. "Tainui" -	Aug. 14—Nov. 24, 1886.	Plymouth to New Zealand and back.	1886, p. 48.
Capt. A. T. Crighton	S.S. "Colina" -	June 3—Oct. 30, 1886.	Between Greenock and Quebec, four and a half voyages.	—
Capt. Geo. Denham -	S.S. "Ocean King."	June 4—Oct 25, 1886.	London and Montreal, four voyages.	1886, p. 36.
Capt. W. Deuchars -	S.S. "Jan Mayen."	Mar. 11—June 18, 1886.	Dundee to Davis Straits -	1885, p. 67.
Capt. J. Gordon -	S.S. "City of Agra."	Aug. 27—Nov. 17, 1886.	Liverpool, Calcutta, and London.	1886, p. 64.
Capt. J. P. Holdich, R.N.R.	"British Envoy"	Dec. 22, 1885—Nov. 17, 1886.	Liverpool, Chittagong, and home.	1885, p. 46.
Capt. A. Simpson -	S.S. "Australasian."	June 26—Nov. 18, 1886.	London, Melbourne, and home.	1886, p. 26.
Capt. A. S. Thomson	S.S. "Silvertown."	July 5—Nov. 13, 1886.	Cable laying, West Coast of Africa.	1886, p. 36.

Mr. Scott was instructed to present the Charts (O. 32) to Captain Crighton, and to convey the best thanks of the Council to the other observers.

Submitted—The following statements of work for November 1886:—

MARINE ROOM.

December 1, 1886.

Examined 23 new logs.

North Atlantic Weather Charts.

The charts to the end of May 1883 prepared for eidographing and the reduction of April advanced.

Forwarded to the lithographer for reproduction charts to February 26, 1883. Proofs of lithographed charts received to January 21st, and five sheets passed for press.

The female clerks engaged on the reduction of the charts and preparing them for the lithographer.

General.

Discussion of Red Sea observations.

Preparing an estimate of the amount of data in the Office available for a discussion of the cyclone of June 1885, in the Gulf of Aden.

The Marine Superintendent. (Signed) CHAS. HARDING.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE.

Telegraphic (Forecast and Storm Warning) Branch.

(To 30th November 1886.)

Monthly Weather Report, 1886 :—

July. Revised.

August. "Copy" nearly ready for press.

September and *October.* Tables of averages and "rough" maps prepared.

Weekly Weather Report, 1886.—Issued to date.

Appendices.—The appendices recently ordered are in hand, and are about half done.

Daily Weather Report.—Issued promptly, to date.

Comparison of Records of Gales experienced at Sumburgh Head with those felt at adjacent Stations.—Completed and handed in.

New Daily Weather Telegrams from the United States.—These have been coming in since November 18, and their consideration has already taken a great deal of my own and Mr. Brodie's time.

Checking of Daily (3.30 p.m. and 8.30 p.m.) *Forecasts*—Complete to date.

Checking of Hay Harvest Forecasts, 1886.—About one half done.

During this month Mr. Brodie took the remaining week of his annual vacation, and while that is so, I can do very little work other than routine work.

(Signed) Fredc. Gaster.

Pantagraph Room.

December 1, 1886.

Observatory Returns.—Hourly Readings, Part II., 1884, proof received to end of May; proof read and signed for press to end of April. Means, &c. for June but very little advanced

Harmonic Analyser.—The analysis of the barograms for 1875 has been completed, and those of one observatory for 1876. A great deal of time was taken up in preparing small and large diagrams for comparison of harmonic analyser results with the mean hourly readings. An introduction was prepared for the Appendix to Part IV. Hourly Readings, 1883. Various parts of this Appendix have undergone frequent revise, the whole being finally passed for press on the 27th.

Miscellaneous.—The regular work of the room has been almost stopped in order to push on the calculation of the mean results required for the Annual Report of the Kew Observatory, which were completed on the 30th.

The Bunhill Row sun-cards were tabulated to end of September, and sent to Royal Meteorological Society.

A little time has been spent in making a final revise of the Krakatoa report, and in supplying a few details, and completing plates.

(Signed) R. H. Curtis.

R. H. Scott, Esq., F.R.S.

Examination Room.

Sir, December 1, 1886.

The following work has been done during the month of November :—

Examinations.

July (1884).—Two *thermograms*, two *barograms*.
March–September (1886) Kew *thermograms* and *barograms*.
Weekly examination on receipt of curves and documents from all stations.

Reports, &c.

Notes of Errors to Kew (thermograms and barograms) for October 1885 to September 1886.
Re over development of Kew curves (M.O. 2408).
Re loss of Kew dry-bulb values (M.O. 2509).

Miscellaneous.

Preparing Form 5 (Exam. Branch) for printer and revising same.
Preparing the 1887 Diary of Operations for printer.

I am, &c.
(Signed) T. E. Allen.

R. H. Scott, Esq., M.A., F.R.S.,
Secretary, Meteorological Council.

Submitted—The following report on the forecasts for November 1886 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

NOVEMBER.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	35	38	37	70
"	b	35	31	33	
"	c	11	23	17	
"	d	19	8	13	
Scotland, E.	a	31	35	33	72
"	b	39	38	39	
"	c	15	12	13	
"	d	15	15	15	
England, N.E.	a	62	31	47	74
"	b	15	39	27	
"	c	12	15	13	
"	d	11	15	13	
England, E.	a	42	39	41	79
"	b	35	42	38	
"	c	23	15	19	
"	d	0	4	2	
Midland Cos.	a	39	42	41	77
"	b	38	35	36	
"	c	19	15	17	
"	d	4	8	6	
England, S.	a	39	46	43	80
"	b	42	27	34	
"	c	15	23	19	
"	d	4	4	4	
Scotland, W.	a	27	31	29	51
"	b	16	27	22	
"	c	42	11	26	
"	d	15	31	23	
England, N.W.	a	31	38	35	66
"	b	27	35	31	
"	c	38	8	23	
"	d	4	19	11	
England, S.W.	a	42	46	44	73
"	b	31	27	29	
"	c	27	8	18	
"	d	0	19	9	
Ireland, N.	a	31	69	50	81
"	b	38	23	31	
"	c	31	8	19	
"	d	0	0	0	
Ireland, S.	a	35	73	54	81
"	b	42	12	27	
"	c	23	8	16	
"	d	0	7	3	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	37	53	45	82
"	b	47	27	37	
"	c	10	17	14	
"	d	6	3	4	
Scotland, E.	a	30	30	30	69
"	b	47	30	39	
"	c	17	23	20	
"	d	6	17	11	
England, N.E.	a	44	40	42	79
"	b	40	33	37	
"	c	13	17	15	
"	d	3	10	6	
England, E.	a	37	33	35	79
"	b	47	40	44	
"	c	6	17	11	
"	d	10	10	10	
Midland Cos.	a	27	33	30	74
"	b	43	44	44	
"	c	20	13	16	
"	d	10	10	10	
England, S.	a	33	33	33	78
"	b	43	47	45	
"	c	17	10	14	
"	d	7	10	8	
Scotland, W.	a	27	33	30	63
"	b	33	33	33	
"	c	27	10	19	
"	d	13	24	18	
England, N.W.	a	37	37	37	67
"	b	23	37	30	
"	c	27	6	17	
"	d	13	20	16	
England, S.W.	a	50	43	47	85
"	b	30	47	38	
"	c	17	7	12	
"	d	3	3	3	
Ireland, N.	a	35	67	51	84
"	b	45	20	33	
"	c	17	7	12	
"	d	3	6	4	
Ireland, S.	a	42	64	53	84
"	b	38	23	31	
"	c	17	10	13	
"	d	3	3	3	

SUMMARY.

British Isles	a	38	44	41	73
"	b	33	31	32	
"	c	23	18	18	
"	d	6	12	9	

British Isles	a	36	42	39	77
"	b	40	35	38	
"	c	17	12	14	
"	d	7	11	9	

Reported—That the following cheques had been drawn during the month of November:—

1886.			£	s.	d.
Nov.	6th.	For weekly salaries	15	18	6
„	13th.	„ „	15	18	6
„	„	Anglo-American Telegraph Co. telegrams	0	18	9
„	„	B. Edgington, signal cones	7	7	0
„	„	W. L. Fox, telegrams from Falmouth	2	7	4
„	„	Postmaster General, telegrams	117	11	0
„	„	A. Buchan, salary (six months)	75	0	0
„	„	J. A. Curtis, reduction of old observations	8	8	0
„	„	A. H. Bell „ „	5	8	0
„	„	R. G. Canham „ „	6	1	6
„	20th	For weekly salaries	15	18	6
„	„	J. Green, care of Bermuda anemometer	4	12	0
„	„	T. W. Baker, inspections	16	0	0
„	22nd.	Deutsche Seewarte (B / E) telegrams	9	10	9
„	27th.	J. P. Wrigley, gas regulators	3	0	0
„	„	Pickford & Co., carriage of parcels	1	0	3
„	„	Bank of England, Navy General Account	1	14	9
„	„	For weekly salaries	15	18	6
„	„	R. H. Scott, Secretary	66	13	4
„	„	J. S. Harding, jun. } "Office salaries"	27	15	6
„	„	T. D. Bell }	15	8	4
„	„	J. Sheerman, salary (harmonic analysis)	10	8	4
„	„	J. E. Cullum „ (Valencia Observatory)	16	13	4
„	„	R. H. Curtis }	22	18	4
„	„	J. A. Curtis }	17	18	4
„	„	T. E. Allen }	16	13	4
„	„	C. H. Thompson } Salaries (discussion, &c. of observations).	12	1	8
„	„	S. Call }	11	5	0
„	„	R. G. Canham }	7	1	8
„	„	A. H. Bell }	7	1	8
„	„	F. Gaster }	25	15	7
„	„	F. J. Brodie }	17	16	3
„	„	G. G. Francis }	17	6	10
„	„	A. J. Rigby } Salaries (preparation, &c. of Weather Reports).	16	17	6
„	„	R. Sargeant }	11	14	4
„	„	A. R. Simpkins }	9	16	10
„	„	H. J. Stevens }	8	15	0
„	„	Capt. H. Toynbee, }	33	6	8
„	„	Nav. Lieut. C. W. Baillie, R.N. }	20	16	8
„	„	R. Strachan }	27	15	6
„	„	C. Harding } Salaries (discussion, &c. of observations and care of instruments)	22	18	4
„	„	H. Harries }	14	11	8
„	„	W. Allingham }	14	11	8
„	„	W. G. James }	10	16	8
„	„	F. T. Bullen }	9	3	4
„	„	R. F. Wallace }	8	6	8
„	30th.	F. Gaster for payment of allowance for late evening and Sunday attendances }	15	18	1
„	„	J. S. Harding, jun., petty cash	50	0	0
			£890	9	9

116, *Victoria Street, December* 15, 1886.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (December 1) were read and confirmed.

Read—The following letter :—

WASHINGTON PRIME MERIDIAN CONFERENCE.

(M.O. 2611.) Science and Art Department, London, S.W., 2nd December 1886.

SIR,

I AM directed by the Lords of the Committee of Council on Education to state that, in pursuance of the report of the Scientific Committee named in the margin,* which was appointed to advise them as to the action to be taken by this country on the decisions of the Washington Prime Meridian Conference, my Lords have decided to recommend the adoption of the 24-hour system of reckoning time, in one continuous series of 0 to 23, starting at midnight, instead of two sets of 12 hours each distinguished by a.m. and p.m.; and I am to state that my Lords trust the Meteorological Council will be willing to co-operate in this matter by adopting this reckoning in all their publications.

I am, &c.
(Signed) J. F. D. DONNELLY.

The Secretary, Meteorological Council,
116, Victoria Street, S.W.

Read—A letter from the Stationery Office (No. 2517) stating that the cost of the portfolio proposed for the Atlantic Charts (Minutes, p. 39), would be 5*s.* per copy, and suggesting that the Charts should be issued in pasteboard cases, a few portfolios being supplied for special use.

Mr. Scott was instructed to accept the above proposal, and request that 50 portfolios be supplied.

Mr. Scott reported—That M. Mascart had proposed to meet him at Boulogne on the 16th instant to discuss the subject of the Atlantic telegrams.—Approved.

Mr. Scott reported—That it had been found impracticable to obtain reports from Lisbon at about 5 p.m. (Minutes, p. 90), as all the public offices in Portugal are closed at that hour. He stated that he had arranged with M. Capello for a report at 3h. 30m. p.m. Lisbon time, and also that the French 6 p.m. service would commence with the new year.

The Hydrographer submitted the subjoined memorandum on the report prepared in the Office on the relative prevalence of gales, which had been forwarded to him. (Minutes, p. 45.) The report referred to consisted of a brief memorandum and two tables, showing—

A. The *total* number of gales from different directions experienced on the various parts of the coasts of the British Islands during each month and year, for the period of 15 years, 1871–85.

C. The *mean* number of gales from different directions experienced on the various parts of the coasts of the British Islands for each month and the whole year, during the 15 years, 1871–85.

For direction the gales had been grouped under the four cardinal points, and had been subdivided into "Gales of all kinds," "General Gales," "Partial Gales," "Severe Gales (general)," and "Severe Gales (partial)." The coasts were divided into the following 10 districts, as proposed by the Hydrographer :—Shetlands, East Scotland, N.E. England, East England, South England, N.W. Scotland, North Ireland, Irish Sea, S.W. England, and S.W. Ireland.

* Professor J. C. Adams, F.R.S.; the Astronomer Royal; the Hydrographer of the Navy; General Strachey, R.E., F.R.S.; Dr. Hind, F.R.S.; Colonel Donnelly, R.E.

MEMORANDUM BY THE HYDROGRAPHER.

An examination of these returns throws some light upon the manner in which the figures in the general gale tables must be regarded.

There is little doubt, from the returns now rendered, that a smaller number of gales is actually reported from Sumburgh Head than at some adjoining stations in Northern Scotland, but there is not sufficient evidence to show whether this is due to the idiosyncrasy of the observer, the local circumstances, or to actual moderation of wind-force.

I do not think that much can be founded upon the returns from individual stations.

In the returns for 10 years for January, the numbers stand thus :—

Sumburgh - - - - - -	22 gales.
Sandwick - - - - - -	44 „
Portland Skerries - - - - - -	22 „

Here Sandwick records double the number of gales reported on either side of it, and is in a more sheltered position besides. It can scarcely be maintained that this can be really the case.

It further appears, on reconsidering the gale prevalence tables for the United Kingdom, that much doubt must attach generally to the "partial gales" recorded, and consequently to the total "gales of all kinds."

When one observer only in a district of six stations reports a gale, it may very well be simply an over-estimate of his, but it appears as a partial gale on his report alone.

When three or more stations report, they confirm one another, and the fact of the wind being above the specified force may be considered as proved.

If we compare the general gales in East and North-west Scotland with the Sumburgh gales, it will be seen that the numbers are very similar.

The relative number of "general gales" in different districts are proportionately distributed according to their localities, as general meteorological knowledge would expect; whereas the "gales of all kinds" give most unexpected results, and are, on investigation, seen to be numerous in proportion to the numbers of stations in the district.

In making any use of these tables, therefore, I should not propose to found anything upon either the "partial" gales or "gales of all kinds," nor, in my opinion, should they find a place in any further abstracts of this kind unless the numbers are given for each station in the district separately.

(Signed) W. J. L. WHARTON.

14th December 1886.

With reference to Mr. Steward's letter (Minutes, p. 83), Mr. Scott was authorised to re-commence the observations of sea-bottom temperature at lightships, and was instructed to submit a list of the stations which he proposed to supply with instruments for the purpose.

Mr. Scott was further instructed to request the Admiral Superintendent of Naval Reserves to continue the observations of sea-surface temperature after December 31, 1886 (Minutes, 1884, p. 73).

Read—Letter from Mr. Buchan (M.O. 2648), requesting permission to obtain tracings of the isobaric charts now in course of preparation by Mr. Baillie.—Sanctioned.

Submitted—A memorandum by Captain Toynbee in accordance with instructions from the Council (Minutes, p. 83), with reference to the amount of material existing for the proposed Indian Ocean charts. Mr. Scott stated that a letter (P.C. 2599) had been written to Mr. Blanford as directed.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 5 logs had been received, 4 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. John Gray -	S.S. "Hope" -	March 15—Aug. 11, 1886.	Greenland, sealing, &c. -	1883, p. 54.
Capt. H. Parsell -	S.S. "Adriatic"	May 28—Oct. 30, 1886.	Queenstown to New York (five voyages).	1886, p. 36.
Capt. W. Randall -	"Earl of Shaftesbury."	April 7—Nov. 30, 1886.	Cardiff, Colombo, Calcutta, and home.	1885, p. 47.
Capt. A Simpson -	Barquentine "Traveller."	April 22—Nov. 4, 1886.	Bo'ness and Dantzic, Peterhead, and Cumberland Gulf.	1885, p. 47.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Submitted—The following Statement respecting the Records for July 1884, received rom the Self-recording Observatories (see Minutes, 21st December 1868, 20th November 876), and 3rd January 1883 :—

	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action of Instrument	Good.	Good.	Good.	Indifft.	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient:—										
Due to stoppage of clock	14 hrs.	14 hrs.	0	0	1 hr.	4 hrs.	0	0	0	0
„ other causes	1	0	21*	24*	0	0	0	0	0	0
Number of errors discovered:—										
By general examination	0	1	2	3	0	0	1	3	0	7
Results of 40 Remeasurements:—										
Greatest difference	1·0	1·0	1·0	1·0	1·0	1·0	1·0	1·0	0·0	2·0
Mean difference irrespective of sign	0·1	0·4	0·2	0·3	0·2	0·5	0·1	0·5	0·0	0·7
Residual difference (—Meteorological Office)	+0·1	0·0	−0·1	+0·1	−0·1	+0·1	0·0	−0·1	0·0	−0·1
Orientation verified	—	—	14th	—	4th	—	9th	—	5th	—
RAIN GAUGE:—										
Action of Instrument	Good.		Indifferent.		Indifferent.		Good.		Good.	
Records deficient:—										
Due to stoppage of clock	0		0		0		0		0	
„ other causes	0		0		0		0		0	
Number of errors discovered:—										
By general examination	0		6		1		2		0	

	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH:—				
Action of Instrument	Good.	Good.	Good.	Good.
Character of Photography	Bad.	Bad.	Do.	Indifferent.
Records deficient:—				
Due to stoppage of clock	0	0	6 hrs.	0
„ failure of light	0	0	0	0
„ other causes	0	0	0	0
No. of errors discovered:—				
In entry of standards	0	9	1	15†
„ calculating residuals	0	1	0	0
„ applying „	0	0	1	0
By general examination	0	5	4	2
Results of 40 Remeasurements:—				
Greatest difference	0·007	0·010	0·004	0·009
Mean difference irrespective of sign	0·003	0·003	0·002	0·003
Residual difference (—Meteorological Office)	0·000	0·000	0·000	+0·002
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	0·002	0·001	0·002	0·002

	Aberdeen.		Falmouth.		Kew.		Valencia.	
THERMOGRAPH:—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Indifferent.		Bad.		Do.		Indifferent.	
Records deficient:—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	0	0	0	0
„ failure of light	0	0	0	0	0	0	0	0
„ imperfectly moistened bulbs	—	5 hrs.	—	0	—	4 hrs.	—	0
„ partially frozen bulbs	—	0	—	0	—	0	—	0
„ other causes	0	0	0	0	1 hr.‡	1 hr.‡	0	0
Number of errors discovered:—								
In entry of standards	0	0	0	2	1	2	1	0
In maxima and minima	1	—	1	—	4	—	0	—
By general examination	1	1	1	6	6	3	3	1
Results of 40 Remeasurements:—								
Greatest difference	0·3	0·2	0·3	0·4	0·2	0·2	0·2	0·4
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	−0·1	0·0	0·0	0·0	0·0	0·0	+0·1	+0·2
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·2	0·2	0·1	0·2	0·2	0·2	0·1	0·1

* Assistant failed to lower pencils sufficiently. † All one inch too high. ‡ Incorrect action of light stop.

Resolved—That a letter be written to the Colonial Office stating that the Council had collected sufficient information from the anemograph at Bermuda, and intended to discontinue the payment of the caretaker.

It was resolved that the usual bonus of 3*l.* 3*s.* be given to the telegraphic reporters under the usual conditions (Minutes, 1882, p. 75).

Submitted—An estimate (Letter 2559) for shelving in Mr. J. Curtis's room, amounting to 24*l.* 1*s.* 9*d.*—Approved.

Reported—That the cash accounts for the six months ended the 30th September 1886 had been audited by the Chairman and Professor Darwin, and had been sent to the Treasury, for the Audit Office. The receipts for the six months, exclusive of a balance of 2,265*l.* 0*s.* 8*d.* on the 1st April 1886, amounted to 7,479*l.* 10*s.* 3*d.* The payments amounted to 7,269*l.* 18*s.* 2*d.*, leaving a balance of 2,474*l.* 12*s.* 9*d.* in hand and at the Bank on the 1st October last.

116, *Victoria Street, January* 12, 1887.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (December 15) were read and confirmed.

Mr. Scott reported that on the 21st ultimo he had held an examination of the boys in the Office to fill the vacancy among the Fourth-class Clerks (Minutes, 1884, p. 119) caused by the resignation of Mr. Aldridge (Minutes, p. 45).

The list of candidates was as follows:—

C. A. Bracey.	C. W. Heinemann.
H. G. Brown.	E. J. Hood.
H. Jay Griffith.	L. H. Powers.

The subjects for examination were—writing, dictation, drawing (freehand and isobars), geography, and arithmetic.

The result of the examination was that C. W. Heinemann was first, and H. J. Griffith second.

The others were decidedly below the first two in answering.

It was resolved that C. W. Heinemann be appointed, salary to commence at 60*l.* per annum, to date from January 1, 1887. The usual increments commencing with April 1888.

Read—Letter No. 116 from Mr. H. J. Stevens, applying for an increase of salary.

The Secretary was instructed to inform Mr. Stevens that the scale of salaries of the Office and the system of increments being fixed, his application cannot be entertained.

Read—Letter No. 115 from Mr. Cullum, applying for an increase of salary from 200*l.* a year, in consideration of 12 years' service, and augmented duties and responsibilities at Valencia.

The Secretary was instructed to inform Mr. Cullum that the Council approve of his being graded as a First-class Clerk (Minutes, 1884, p. 119), with an advance of salary from January 1, 1887, to 225*l.*; the usual increments commencing with April 1888.

Mr. Scott reported that on the 16th ultimo (Minutes, p. 95) he had met Professor Mascart at Boulogne, and had discussed the subjects of the Atlantic telegrams, and also the 6 p.m. reports to London from French stations.

It was arranged that for the present the reports from New York to Paris should be transmitted to London by post.

Mr. Scott further reported that on the 1st instant the service of evening reports from the French stations (excepting Belfort) and from Lisbon had commenced (Minutes, p. 95).

Submitted—The following letters (Minutes, p. 98):—

SIR, Meteorological Office, December 22, 1886.

WITH reference to your letters dated the 30th November and 31st December 1878 I am directed by the Meteorological Council to inform you that they consider that they have collected sufficient information for their present purposes from the anemometer at Bermuda, and that they contemplate discontinuing the allowance of 1*s.* a day to the caretaker, Sergeant J. Green, of the Army Hospital Corps.

I am to inquire whether the Colonial Office would wish to continue the observations; as, if so, the Council would place the instrument at their disposal. Otherwise the Council would be glad to have the anemometer returned; and, in this case, I am to ask whether the Colonial Office would kindly give directions for the instrument to be carefully packed and sent to their Office.

I am, &c.
(Signed) ROBERT H. SCOTT.
Secretary.

The Under Secretary, Colonial Office.

(M.O. 5.)

SIR, Downing Street, December 31, 1886.

I AM directed by Mr. Secretary Stanhope to acknowledge the receipt of your letter M.O. of the 22nd instant, and to request that you will inform the Meteorological Council that he is obliged to them for their offer of the anemometer at Bermuda, but that he will not avail himself of it.

The Governor of Bermuda has accordingly been instructed to have the instrument carefully packed and sent to the Meteorological Office.

I am, &c.
(Signed) EDWARD WINGFIELD.

The Secretary to the Meteorological Office.

Read—Letter 2777 from Mr. Buchan, stating that the returns from seven Scotch stations (Minutes, p. 89) would be supplied for the Weekly Weather Report.

Read—Letter 2794, from the Office of Naval Reserves, stating that the observations of sea temperature would be continued at the coast-guard stations uutil December 31, 1889 (Minutes, p. 96).

Read—Letter from the Stationery Office (dated December 23), taking exception to the proposed number of 50 portfolios for the Atlantic Charts (Minutes, p. 95).

Mr. Scott was instructed to forward a list of 25 names, and request that portfolios be supplied for these (P.C. 99).

Submitted—The following report:—

SIR, Meteorological Office, December 31, 1886.

I HAVE the honour to report, for the information of the Council, on the work which has been done during the quarter ending 31st December 1886.

CURRENT CHARTS.

Pacific Ocean.—The plotting of the currents from the Office logs for the month of August (referred to in my last report 30th September 1886) has been completed, and the currents for May have also been plotted during the quarter.

PRESSURE CHARTS.

Four of the large charts have been passed for press, which leaves eight large and eight small charts still to be printed.

I am, &c.
(Signed) C. W. BAILLIE,
Nav.-Lieut., R.N.

The Marine Superintendent.

Forwarded for the information of the Council.
H. T.

January 12, 1887.

P.S.—The printing of the pressure charts has been in hand since November 1885.

Four of the large charts have been passed for press, which leaves eight large and eight small charts still to be printed. I have only one proof in hand.

Mr. Dangerfield states that this slow progress is owing to the fact that he has only one man who can perform the work sufficiently well to satisfy the Council.

(Signed) C. W. BAILLIE,
Nav. Lieut., R.N.

Mr. Scott was instructed to inquire at the Stationery Office if this work of Mr. Dangerfield's could not be accelerated (P.C. 100).

Authority was given to order the following instruments:—

	£	s.	d.
12 maximum thermometers (price with verification) - -	12	4	10
12 wooden bowls for Campbell's sunshine recorder at 7*s.* each -	4	4	0

Submitted—The following statements of work for November 1886:—

MARINE ROOM.

January 11, 1887.

Examined 10 new logs.

North Atlantic Weather Charts.

Proofs received of lithographed charts to February 11, 1883, and five sheets passed for press.
The reduction by eidograph of the charts for April completed.
Obtaining the lowest barometer readings near the centres of disturbances during May.
Progress made with the preparation of June charts for eidographing.
The female clerks engaged on the reduction of the charts and preparing them for the lithographer.

General.

Discussion of Red Sea observations.
Obtaining currents on cable grounds from logs 6597 and 6600 for the Hydrographer.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council,

(Signed) HENRY TOYNBEE.
Marine Superintendent.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.

December 1886.

Monthly Weather Report, 1886:—
July, published.
August, passed for press.
September, in proof.
October, in press.
November, more than half done.
(These reports I have been working at both at home and in the Office in order to bring them up to date at once.)

Weekly Weather Report, 1886.—Issued to date.

The appendices ordered by the Council (Minutes, p. 75) are advanced as far as they possibly can be till January 3, and most of them are in the printer's hands.

Daily Weather Report.—Issued promptly to date.

Preparation of Mean Weekly Values for Accumulated Heat, above and below 42° F., in each district.—Tables prepared; and diagrams for "smoothing down" the results (for use as averages in the Weekly Weather Report) about one third done.

Checking of Daily (3.30 p.m. and 8.30 p.m.) *Forecasts.*—Done to date.

Checking of Hay Harvest Forecasts, 1886.—Nearly completed.

United States Daily Telegrams.—Observations plotted regularly and their indications considered daily.

Charts showing (by arrows) movements of isobars around the points of "no change," as suggested by Professor Darwin. Several duplicate maps drawn.

Christmas Holidays.—These have been taken by about half the staff.

A great deal of delay has been caused by the breakdown of telegraphic communication with the southern stations owing to the snowstorm of December 26–27.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

January 1, 1887.

Observatory Returns.—The calculation of the daily and five-daily means and of the hourly vapour tension values for June 1884 completed, and the Hourly Readings copied for printer. The same work for July now in hand, but not far advanced. Proof of "Hourly Readings" read and signed for press to the end of Part II., 1884.

Quarterly Weather Report.—The letterpress, tables, &c. for Part II., 1878, completed and forwarded to printer, together with accompanying maps. The letterpress and tables for Part III. and also the chart plates are in hand.

Harmonic Analyser.—The analysis of the July barograms for 1875 completed for two observatories. This work has been temporarily stopped to allow of the filling up of the "Result Sheets" for the 12 years temperature work; the sheets have been filled up for three years.

Miscellaneous.—A memorandum prepared in reply to a draft memorandum on examination of tabulations, &c.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

January 3, 1887.

Report of work done:—

Examinations.

July (1884).—Five *anemograms.*
August (1884).—Two *thermograms;* two *barograms;* and five *anemograms.*
September (1884).—Two *thermograms;* and two *barograms.*
Weekly examination (on receipt) of all curves and documents.

Reports, &c.

Notes of Errors to Aberdeen, Armagh (anemogram), Falmouth, Kew (anemogram), and Valencia (anemogram) for *July* and *August* 1884, and report thereon to Council.

Investigating Falmouth wet bulb differences (S–T), and submitting memorandum on same (M.O. 2622).

Re memoranda on observatory work and examination thereof.

Re errors in Falmouth barogram tabulation and journal.

Re inattention to barograph at Aberdeen during gale of the 8th.

Miscellaneous.

Correcting proof of the 1887 Diary of Operations, and revising the same.

The usual Christmas holidays have been taken by the staff.

(Signed) T. E. ALLEN.

HAY HARVEST FORECASTS, 1886.

SIR,

I BEG to submit herewith the results of the checking of the Hay Harvest Forecasts for 1886.

The issue of the forecasts commenced with those for England N.E., England E., Midland counties, and England S., on the 17th June, those for other districts were added as the season advanced.

The result of this year's checking shows that the general percentage of successful forecasts has been slightly higher than in the preceding year. The largest percentage (89) was reached in England, E., while the smallest (74) was in Ireland, N.

Several of the recipients have voluntarily borne testimony to the success of the forecasts this year. Mr. Birkbeck, of Norwich, states that "the forecasts have again been remarkably correct." Mr. McGarva, the agent for Mr. Stewart, of Ardwell, Stranraer, remarks that "the forecasts have been quite correct," and another subscriber, Mr. McCready, of Moneygall, Roscrea, also says the forecasts have been "remarkably correct." Mr. Neville, of Butleigh Court, Glastonbury, has spoken very highly of them to myself when calling at the Office to make an inquiry.

I am, &c.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

(Signed) FREDC. GASTER.

SUMMARY of RESULTS.

Districts.	Names of Stations.	Per-centages.				Total Per-centage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
SCOTLAND, N.	Golspie and Munlochy	62	24	11	3	86
SCOTLAND, E.	Longniddry, Aberfeldy, Braco, Glamis.	46	41	7	6	87
ENGLAND, N.E.	Ulceby and Chatton, Northumberland.	52	33	14	1	85
ENGLAND, E.	Rothamsted and Thorpe	47	42	9	2	89
MIDLAND COUNTIES	Cirencester and East Retford	43	39	18	—	82
ENGLAND, S.	Horsham, Maidstone, and Downton	49	38	12	1	87
SCOTLAND, W.	Dumbarton, Stranraer, and Islay	66	20	13	1	86
ENGLAND, N.W.	Leyburn, Knutsford, and Prescot	57	27	14	2	84
ENGLAND, S.W.	Bridgend (Glamorgan), Clifton, Glastonbury, and Falfield.	57	26	14	3	83
IRELAND, N.	Hollymount and Moynalty	48	26	14	12	74
IRELAND, S.	Moneygall and Kilkenny	54	31	13	2	85
	Mean for all districts	53	31	13	3	84

HAY HARVEST FORECASTS, 1886.

RETURN showing the NUMBER of FORECASTS sent to each of the under-mentioned PERSONS, with the SUCCESS or otherwise of FORECASTS.

Districts	To whom sent.	Address.	No. of Forecasts sent.	No. of Forecasts checked.	Per-centages.				Remarks.
					Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
0. SCOTLAND, N.	Rev. Dr. Joass	Golspie	30	30	50·0	36·7	13·3	—	
	Major Smith	Munlochy, Inverness	30	30	73·3	10·0	10·0	6·7	During the progress of the service Major Smith frequently alluded to the accuracy of the forecasts.
1. SCOTLAND, E.	W. S. Macdonald	Craigielaw, Longniddry	30	24	45·8	37·5	4·2	12·5	
	C. W. L. Forbes	Aberfeldy	30	30	40·0	50·0	10·0	—	
	A. F. Leslie	Braco, Keith	30	30	40·0	50·0	10·0	—	
	G. Johnstone	Glamis, by Forfar	30	30	60·0	30·0	6·7	3·3	Mr. Johnstone says, "I may tell you how "very highly your telegrams are ap- "preciated. * * * Agriculturists "are ever on the look out for them."
2. ENGLAND, N.E.	J. Turner	The Grange, Ulceby	27	24	41·7	37·5	20·8	—	
	J. Wilson	Chillingham Barns, Chatton, Northumberland.	58	58	62·1	29·3	6·9	1·7	
3. ENGLAND, E.	Sir J. B. Lawes, Bart.	Rothamsted, Harpenden	27	21	42·9	42·8	14·3	—	
	W. Birkbeck	High House, Thorpe, Norwich	27	27	51·9	40·7	3·7	3·7	Mr. Birkbeck remarked that "the forecasts have again been remarkably correct."
4. MIDLAND COUNTIES	Professor H. Ohm	Royal Agricultural College, Cirencester.	27	27	44·5	37·0	18·5	—	
	E. E. Harcourt-Vernon	Grove Hall, East Retford	33	32	40·9	40·9	18·2	—	
5. ENGLAND, S.	G. M. Allender	Stammerham, Horsham	27	27	37·0	48·2	14·8	—	
	C. Whitehead	Barming House, Maidstone	27	27	63·0	29·6	7·4	—	
	E. P. Squarey	The Moot, Downton, Wilts	27	27	48·2	33·3	14·8	3·7	
6. SCOTLAND, W.	W. Calder	Castlehill, Dalreoch, Dumbarton	30	30	66·7	20·0	10·0	3·3	
	M. J. Stewart	Ardwell, Stranraer	30	30	66·7	30·0	3·3	—	Mr. McGarva, agent for Mr. Stewart, states that "the forecasts have been quite correct."
	J. S. R. Ballingal	Eallabus House, Islay	30	23	65·2	8·7	26·1	—	
7. ENGLAND, N.W.	G. W. Wray	Leyburn, Yorks	27	24	66·6	29·2	4·2	—	
	J. F. Smith, for Lord Egerton of Tatton.	Tatton Park, Knutsford	78	72	40·3	33·3	20·8	5·6	
	F. Harrison, for the Earl of Derby.	Knowsley Gardens, Prescot	27	27	63·0	18·5	18·5	—	
	Colonel T. P. Turbervill	Ewenny Priory, Bridgend, Glamorganshire.	30	30	53·4	23·3	13·3	10·0	
8. ENGLAND, S.W.	T. Dyke	Long Ashton, Clifton, Bristol	18	18	61·1	27·8	11·1	—	
	R. Neville	Butleigh Court, Glastonbury	30	30	60·0	20·0	20·0	—	
	J. Harle, for the Earl of Ducie.	Whitfield, Falfield, R.S.O.	30	30	53·4	33·3	13·3	—	
9. IRELAND, N.	Rev. A. Brown	The Manse, Hollymount, Co. Mayo	30	30	50·0	23·4	13·3	13·3	
	E. F. Farrell	Moynalty, Kells, Co. Meath	42	41	46·3	29·3	14·6	9·8	
10. IRELAND, S.	D. A. McCready	Larchvale, Moneygall, Roscrea	30	30	56·7	36·7	6·6	—	Mr. McCready says that the forecasts have been "remarkably correct."
	W. Talbot Crosbie	Ardfert Abbey, Tralee	30		No weather record kept.				
	D. A. Milward	Lavistown, Kilkenny	30	30	50·0	26·7	20·0	3·3	

Submitted—The following Statement respecting the Records for August 1884, received from the Self-recording Observatories (see Minutes, 21st December 1868, and 20th November 1876, and 3rd January 1883):—

	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action of Instrument	Good.	Good.	Good.	Indifft.	Good.	Good.	Good.	Good.	**{Indifft. / Good.}	Good.
Records deficient:—										
Due to stoppage of clock	0	0	15 hrs.*	17 hrs.*	0¶	0¶	0	0	0	0
„ other causes	0	0	1 hr.†	2 hrs.†	7 hrs.	6 hrs.	0	0	126 hrs.§	127hrs.§
Number of errors discovered:—										
By general examination	0	0	0	2	2	3	0	4	0	0
Results of 40 Remeasurements:—										
Greatest difference	1·0	1·0	1·0	1·0	1·0	2·0	1·0	2·0	1·0	2·0
Mean difference irrespective of sign	0·1	0·4	0·0	0·2	0·0	0·4	0·1	0·3	0·0	0·6
Residual difference (—Meteorological Office)	+0·1	+0·1	0·0	0·0	0·0	+0·1	−0·1	−0·1	0·0	0·0
Orientation verified	30th	—	14th	—	—	—	15th	—	19th	—

	Aberdeen.	Armagh.	Falmouth.	Kew.	Valencia.
RAIN GAUGE:—					
Action of Instrument	Good.	Good.	Good.	Good.	Good.
Records deficient:—					
Due to stoppage of clock	0	0	0	0	0
„ other causes	0	0	2 hrs.‖	0	0
Number of errors discovered:—					
By general examination	0	1	21	0	0

	Aberdeen.		Falmouth.		Kew.		Valencia.	
BAROGRAPH:—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Fair.		Bad.		Do.		Indifferent.	
Records deficient:—								
Due to stoppage of clock	0		0		0		0	
„ failure of light	0		5 hrs.		0		0	
„ other causes	0		1 hr.‡ 3 hrs.†		0		4 hrs.†	
Number of errors discovered:—								
In entry of standards	0		3		1		2	
„ calculating residuals	0		1		1		0	
„ applying „	0		0		2		0	
By general examination	0		2		0		3	
Results of 40 Remeasurements:—								
Greatest difference	·008		·007		·005		·005	
Mean difference irrespective of sign	·002		·003		·002		·002	
Residual difference (—Meteorological Office)	—·001		—·001		—·001		·000	
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	·002		·001		·003		·001	
THERMOGRAPH:—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Fair.		Bad.		Do.		Indifferent.	
Records deficient:—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	0	0	4 hrs.	4 hrs.
„ failure of light	0	0	0	0	1 hr.	0	5 hrs.	11 hrs.
„ imperfectly moistened bulbs	—	0	—	0	—	3 hrs.	—	0
„ partially frozen bulbs	—	0	—	0	—	0	—	0
„ other causes	0	0	2 hrs.†	2 hrs.†	1 hr.†	1 hr.†	4 hrs.†	4 hrs.†
Number of errors discovered:—								
In entry of standards	0	0	2	3	0	2	0	3
„ maxima and minima	0	—	7	—	3	—	3	—
By general examination	0	0	0	3	11	0	1	4
Results of 40 Remeasurements:—								
Greatest difference	0·2	0·2	0·2	0·3	0·2	0·3	0·2	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	0·0	+0·1	0·0	0·0	0·0	0·0	+0·1	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·2	0·2	0·1	0·1	0·2	0·2	0·1	0·2

* Clock found stopped, "Cause unknown." † Cleaning instrument. ‡ Fingermarked. § Changing instruments.
‖ Cause not given. ¶ Regulation of clock bad.
** The two characters relate to different instruments. The old was in use up to 10.30 a.m. 13th, and the new from 4.44 p.m. 19th.

Submitted—The following Statement respecting the Records for September 1884, received from the Self-recording Observatories (see Minutes, 21st December 1868, 20th November 1876, and 3rd January 1883) :—

	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH :—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action of Instrument	Good.	Good.	Good.	Indiff.*	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient :—										
Due to stoppage of clock	0	0	0	0	0	0	0	0	0	0
„ other causes	0	0	0	0	0	0	0	0	0	0
Number of errors discovered :—										
By general examination	0	0	0	3	2	0	0	1‡	0	6
Results of 40 Remeasurements :—										
Greatest difference	1·0	1·0	1·0	1·0	0·0	2·0	0·0	1·0	1·0	3·0
Mean difference irrespective of sign	0·0	0·2	0·1	0·3	0·0	0·3	0·0	0·4	0·0	0·7
Residual difference (—Meteorological Office)	0·0	+0·1	−0·1	+0·1	0·0	0·0	0·0	−0·1	0·0	0·0
Orientation verified	30th	—	—	—	9th	—	17th	—	11th	—

RAIN GAUGE :—					
Action of Instrument	Good.	Indifferent.†	Good.	Good.	Good.‖
Records deficient :—					
Due to stoppage of clock	0	0	0	0	0
„ other causes	0	0	0	0	0
No. of errors discovered :—					
By general examination	0	0	0	0	0

	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH :—				
Action of Instrument	Good.	Good.	Good.	Good.
Character of Photography	Do.	Bad.	Do.	Do.
Records deficient :—				
Due to stoppage of clock	0	0	0	0
„ failure of light	0	0	0	0
„ other causes	1 hr.§	0	0	0
Number of errors discovered :—				
In entry of standards	1	1	0	1
„ calculating residuals	0	3	0	0
„ applying	0	1	0	0
By general examination	0¶	0	2	7
Results of 40 Remeasurements :—				
Greatest difference	·005	·008	·005	·005
Mean difference irrespective of sign	·002	·003	·002	·003
Residual difference (—Meteorological Office)	+·001	+·001	·000	·000
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	·002	·001	·002	·002

THERMOGRAPH :—	Aberdeen.		Falmouth.		Kew.		Valencia.	
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Indifferent.		Do.		Fair.	
Records deficient :—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	0	0	0	0
„ failure of light	0	0	0	0	0	0	0	3 hrs.
„ imperfectly moistened	—	0	—	0	—	1 hr.	—	1 hr.
„ partially frozen bulbs	—	0	—	0	—	0	—	0
„ other causes	3 hrs.§	3 hrs.§	0	0	0	0	0	0
Number of errors discovered :—								
In entry of standards	0	0	1	1	0	1	1	0
„ maxima and minima	0	—	0	—	4	—	0	—
By general examination	0	0	4	1	0	7	2	2
Results of 40 Remeasurements :—								
Greatest difference	0·2	0·2	0·3	0·3	0·2	0·2	0·2	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	0·0	+0·1	0·0	+0·1	0·0	0·0	+0·1	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·1	0·1	0·1	0·1	0·1	0·2	0·1	0·2

* Trace intermittent in low velocities.
† Curves pencilled over contrary to rules.
‡ Entry of correction for friction very unsystematic throughout the month.
‖ Papers indifferently attached.
§ Examining instrument.
¶ Instructions respecting "H" values ignored throughout the month.

Submitted—The following report on the forecasts for December 1886:-

The letters used have the following signification:—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

DECEMBER.

3.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	28	56	42	82
"	b	40	40	40	
"	c	20	4	12	
"	d	12	0	6	
SCOTLAND, E.	a	21	40	31	76
"	b	42	48	45	
"	c	12	12	12	
"	d	25	0	12	
ENGLAND, N.E.	a	40	44	42	84
"	b	36	48	42	
"	c	16	0	8	
"	d	8	8	8	
ENGLAND, E.	a	24	56	40	76
"	b	52	20	36	
"	c	16	4	10	
"	d	8	20	14	
MIDLAND COS.	a	34	48	41	66
"	b	25	24	25	
"	c	33	8	20	
"	d	8	20	14	
ENGLAND, S.	a	54	48	51	78
"	b	29	24	27	
"	c	4	12	8	
"	d	13	16	14	
SCOTLAND, W.	a	32	32	32	58
"	b	20	32	26	
"	c	32	12	22	
"	d	16	24	20	
ENGLAND, N.W.	a	44	60	52	76
"	b	28	20	24	
"	c	20	8	14	
"	d	8	12	10	
ENGLAND, S.W.	a	46	60	53	74
"	b	25	16	21	
"	c	21	12	16	
"	d	8	12	10	
IRELAND, N.	a	48	52	50	76
"	b	28	24	26	
"	c	16	12	14	
"	d	8	12	10	
IRELAND, S.	a	33	36	35	67
"	b	29	36	32	
"	c	17	16	17	
"	d	21	12	16	

8.30 P.M.

DISTRICTS.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
SCOTLAND, N.	a	45	78	62	83
"	b	23	19	21	
"	c	23	3	13	
"	d	9	0	4	
SCOTLAND, E.	a	48	55	52	76
"	b	16	32	24	
"	c	23	10	16	
"	d	13	3	8	
ENGLAND, N.E.	a	49	45	47	81
"	b	26	42	34	
"	c	19	3	11	
"	d	6	10	8	
ENGLAND, E.	a	36	35	36	79
"	b	45	42	43	
"	c	13	10	12	
"	d	6	13	9	
MIDLAND COS.	a	23	32	28	70
"	b	48	36	42	
"	c	19	19	19	
"	d	10	13	11	
ENGLAND, S.	a	36	32	34	68
"	b	35	32	34	
"	c	19	16	17	
"	d	10	20	15	
SCOTLAND, W.	a	36	36	36	73
"	b	29	45	37	
"	c	19	6	13	
"	d	6	13	14	
ENGLAND, N.W.	a	36	52	44	83
"	b	45	32	39	
"	c	19	10	14	
"	d	0	6	3	
ENGLAND, S.W.	a	58	52	55	79
"	b	19	29	24	
"	c	10	6	8	
"	d	13	13	13	
IRELAND, N.	a	52	55	54	84
"	b	32	29	30	
"	c	10	0	5	
"	d	6	16	11	
IRELAND, S.	a	39	35	37	83
"	b	39	52	46	
"	c	9	3	6	
"	d	13	10	11	

SUMMARY.

BRITISH ISLES	a	37	48	43	74
"	b	32	30	31	
"	c	19	9	14	
"	d	12	13	12	

BRITISH ISLES	a	42	46	44	78
"	b	32	35	34	
"	c	17	8	12	
"	d	9	11	10	

Read—A memorandum from Captain Toynbee, reporting that since the last meeting 11 logs had been received, 8 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. W. C. Crutchley, R.N.R.	S.S. "Kaikoura"	Aug. 28—Dec. 27, 1886.	To and from New Zealand, viâ the Capes.	1886, p. 64.
Capt. C. W. Kennedy Mr. C. Lancaster (2nd Officer).	S.S. "Germanic."	May 7—Nov. 19, 1886.	To and from New York (5 voyages).	1886, p. 23.
Capt. R. H. Machugh	S.S. "Ching Wo."	Aug. 19—Dec. 17, 1886.	To and from China.	—
Capt. A. McLean -	S.S. "Concordia"	May 2—Sept. 25, 1886.	To and from Montreal (4 voyages).	1885, p. 67.
Captain C. W. Pearson.	S.S. "Strathleven."	Jan. 11—Dec. 23, 1886.	Gibraltar, China, Japan, New York, Savannah, and Liverpool.	1885, p. 96.
Capt. H. Walker -	S.S. "Cephalonia."	June 23, 1886—Jan. 8, 1887.	To and from Boston (6 voyages).	1886, p. 65.
Capt. N. J. Wheaton	"Eliza" -	Sept. 1, 1886—Jan. 1, 1887.	To and from Demerara -	1886, p. 65.
Capt. H. Williams -	"Dynomene" -	Nov. 11, 1885—Nov. 17, 1886.	Cardiff to Singapore, Calcutta, and Hull.	—

Mr. Scott was instructed to present the charts (O. 32) to Captains Machugh and Williams, and to Mr. Lancaster, and to convey the best thanks of the Council to the other observers.

Reported—That the following cheques had been drawn for the month of December:—

1886.			£	s.	d.
Dec. 4th.	J. S. Harding, jun., payment of weekly salaries -	-	15	18	6
„ 11th.	Postmaster General, telegrams - - -	-	141	18	9
„ „	J. S. Harding, jun., payment of weekly salaries -	-	15	18	6
„ 17th.	Anglo-American Telegraph Company, telegrams	-	5	9	9
„ 18th.	J. S. Harding, jun., payment of weekly salaries -	-	15	18	6
„ 24th.	„ „ -	-	15	18	6
„ 31st.	R. H. Scott, Secretary - - - -	-	66	13	4
„ „	J. S. Harding -	"Office" salaries -	27	15	6
„ „	T. D. Bell - -		15	8	4
„ „	J. Sheerman, salary (harmonic analysis) -	-	10	8	4
„ „	J. E. Cullum, salary (Valencia Observatory)	-	16	13	4
„ „	R. H. Curtis -	Salaries (discussion, &c. of observations).	22	18	4
„ „	J. A. Curtis - -		17	18	4
„ „	T. E. Allen - -		16	13	4
„ „	C. H. Thompson -		12	1	8
„ „	S. Call - -		11	5	0
„ „	R. G. Canham -		7	1	8
„ „	A. H. Bell - -		7	1	8
„ „	F. Gaster - -	Salaries (preparation, &c. of weather reports).	25	15	7
„ „	F. J. Brodie -		17	16	3
„ „	G. G. Francis -		17	6	10
„ „	A. J. Rigby -		16	17	6
„ „	R. Sargeant -		11	14	4
„ „	A. R. Simpkins -		9	16	10
„ „	H. J. Stevens - -		8	15	0
	Carried forward - - -		£551	3	8

			£	s.	d.
1886.		Brought forward - - -	551	3	8
Dec. 4th.	Capt. H. Toynbee -	Salaries (discussion, &c. of observations and care of instruments).	33	6	8
„ „	Nav.-Lt. C. W. Baillie, R.N. - -		20	16	8
„ „	R. Strachan - -		27	15	6
„ „	C. Harding - -		22	18	4
„ „	H. Harries - -		14	11	8
„ „	W. Allingham -		14	11	8
„ „	W. G. James -		10	16	8
„ „	F. T. Bullen - -		9	3	4
„ „	R. F. Wallace -		8	6	8
„ „	G. J. Mayhew, rent - - - - - -		158	15	0
„ „	J. S. Harding, senr., pension (Minutes, 1882, p. 43) -		10	14	1
„ „	F. Gaster, for payment of late evening and Sunday attendances - - - - - -		17	9	11
		£ s. d.			
„ „	W. Thomas, care of Scilly anemometer	1 13 1			
„ „	„ meteorological reports -	8 3 3			
			9	16	4
„ „	H. Williams, care of bridled anemometer - - -	2 10 8			
„ „	„ care of Robinson's anemometer - - - -	2 11 3			
			5	1	11
„ „	C. Niven, Aberdeen - - -	63 6 1			
„ „	J. L. E. Dreyer, Armagh - -	13 2 6			
„ „	W. L. Fox, Falmouth - - -	62 7 0			
„ „	Improvement Commissioners Fleetwood	2 19 7			
„ „	R. Grant, Glasgow -	18 14 0			
„ „	G. M. Whipple, Kew - -	100 0 0			
„ „	W. Harrison, North Shields - -	3 15 2			
„ „	W. I. Fortescue, Orkney - -	2 10 0			
„ „	Rev. S. J. Perry, Stonyhurst - -	14 0 0			
„ „	J. O'Driscoll (rent), Valencia - -	25 0 6			
„ „	J. E. Cullum, Valencia - - -	55 16 5			
			361	11	3
„ „	G. T. Watson, care of Yarmouth anemometer - - -	3 18 6			
„ „	„ meteorological reports -	7 12 4			
			11	10	10
„ „	A. Buchan, salary - - -	37 10 0			
„ „	W. C. Ley, „ - - -	37 10 0			
			75	0	0
„ „	J. McCormack, Aberdeen* - -	3 3 0			
„ „	J. W. Mayes, Ardrossan* - -	3 3 0			
„ „	M. J. Tolan, Belmullet* - - -	3 3 0			
„ „	H. Todd, Cambridge* - - -	7 19 6			
„ „	H. Mohn, Christiania - - -	5 10 0			
„ „	T. McGowan, Donaghadee* - -	3 3 0			
„ „	P. Curnow, Dungeness* - - -	7 14 7			
„ „	W. Edmonds, „ - - -	2 12 0			
„ „	W. Brand, Dunrossness - - -	7 1 8			
„ „	W. H. Bunce, Hawes Junction† - -	3 10 9			
„ „	S. Richards, Holyhead* - - -	7 14 5			
„ „	G. G. Appleton, Hurst Castle* - -	7 1 7			
„ „	J. Fisher, Jersey* - - -	8 3 0			
„ „	W. Hay, Leith* - - - -	3 3 0			
„ „	F. Gaster, London* - - -	7 1 0			
	Carried forward - -		£1,363	10	2

* Bonus of 3*l.* 3*s.* allowed.
† „ 1*l.* 11*s.* 6*d.* (half rate) allowed.

		£	s.	d.	£	s.	d.
1886.	Brought forward -	-		-	1,363	10	2
Dec. 4th.	W. Berridge, Loughborough* - -	6	8	6			
,, ,,	Lloyd's, for Malin Head - - -	3	5	0			
,, ,,	J. O. D. Farren* - - -	3	3	0			
,, ,,	K. Kerr, Mullaghmore* - - -	8	9	0			
,, ,,	A. Penny, Nairn* - - -	7	9	0			
,, ,,	J. W. Irvine, North Shields* - -	3	3	0			
,, ,,	W. Wickham, Oxford* - - -	6	15	6			
,, ,,	B. Budds, Parsonstown* - -	6	10	6			
,, ,,	J. John, Prawle Point* - - -	6	8	0			
,, ,,	W. Kennedy, Roche's Point* - -	3	3	0			
,, ,,	S. Blake, St. Ann's Head* - -	6	10	6			
,, ,,	J. B. Smith, Spurn Head* - -	6	8	5			
,, ,,	D. Macdonald, Stornoway* - -	8	15	3			
,, ,,	J. Sinclair, Wick* - - -	6	8	0			
,, ,,	F. Guy, York - - - -	3	18	0			
					166	18	2
,, ,,	J. R. Jones, Aberdeen agent - -	5	0	9			
,, ,,	J. Fowler, Cardiff ,, - -	10	13	8			
,, ,,	L. Allen, Dundee ,, - -	2	11	0			
,, ,,	D. McGregor & Co., Glasgow agents -	6	18	5			
,, ,,	Z. Scaping, Hull agent - - -	1	7	6			
,, ,,	J. R. Gill, Liverpool agent - -	15	0	4			
,, ,,	C. H. Permain, Southampton agent -	1	7	6			
					42	19	2
,, ,,	P. Adie, repairing "A" barometers -	32	0	6			
,, ,,	,, ,, B. T. ,, -	48	8	0			
					80	8	6
,, ,,	Kew Committee verifications ("A") -	28	7	0			
,, ,,	,, ,, ("B") -	7	10	0			
,, ,,	,, ,, ("C") -	4	8	0			
					40	5	0
,, ,,	J. S. Harding, jun., petty cash - -	-		-	40	0	0
,, ,,	Williams and Norgate, books - -	-		-	3	2	9
,, ,,	R. W. Munro, finishing North Shields anemometer - -	4	3	11			
,, ,,	,, finishing Fleetwood anemometer - -	11	10	6			
					15	14	5
					£1,752	18	2

* Bonus of 3*l.* 3*s.* allowed.

116, *Victoria Street, January* 26, 1887.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (January 12) were read and confirmed.

Read.—Letter 186 from the Stationery Office respecting the delay in execution of the barometric pressure charts (Minutes, p. 99). Mr. Scott was instructed to reply (P.C. 221) that the cause of the rejection of some of the proof charts was that Messieurs Dangerfield's work did not come up to the standard supplied to him, and that there had been no delay in supplying him with the MS. charts.

Submitted the following correspondence:—

(P.C. 98.)

DEAR MR. SYMONS, Meteorological Office, January 13th, 1887.

I WAS instructed by the Council to ask what would be your views as to a honorarium for the continuance of your Rainfall Tables for the lustrum 1881–5, on similar lines to the volume for 15 years we have published. I fear some of the stations will have dropped off.

Yours, &c.

G. J. Symons, Esq. (Signed) ROBERT H. SCOTT.

62, Camden Square, London, N.W.

DEAR MR. SCOTT, January 19th, 1887.

IT is not very easy to decide what time it will take to prepare a proper sequel to the Rainfall Tables, and therefore it is not easy to suggest a suitable honorarium.

From a small preliminary trial it appears that about one third of the old stations have become more or less imperfect,—that means special consideration of what is best to be done respecting about 115 stations; in some cases where the interruption has been only for a few days or a month it will be possible to compute the amount (duly marking the entry as such) and so preserve the continuity of the record. But in the majority of cases new records must be chosen, and there arises a question which I think should be decided by the Council, viz., whether the new stations should not wherever possible be stations of which I have the records for *two* lustra and whether *for them* the values for 1876–80 should not be given so as to overlap and bind the two sets of tables together.

In all respects, excepting straightforward copying, the present work will be just as heavy as (if not heavier than) the previous one, and therefore, although at first sight one would naturally think that, 5 years being a third of 15, this should cost one third of 400*l.* I am sure that one third or 133*l.* would not repay the labour and responsibility incurred. As far as I am able to judge, I think that 250*l.* would be fair to both parties, unless the new stations are carried back to 1876, in which case another 50*l.* should be added for the (probably) 500 years thus supplied.

Yours, &c.

R. H. Scott, Esq., F.R.S. (Signed) G. J. SYMONS.

The Council was of opinion that further action in that matter may be postponed for the present, and Mr. Scott was instructed to inform Mr. Symons accordingly (P.C. 335).

Read—Letter 155 from the Post Office supplying particulars as to the damage caused to their wires by the snowstorm of December 26–27, 1886, and requesting information as to wind and weather.

Mr. Scott was instructed to ask for a map showing the districts affected (P.C. 219).

Submitted—The following statement of accounts for the nine months ending 31st December 1886:—

Income.	£ s. d.	£ s. d.
Balance from year 1885–86		1,555 7 11
Proportion of vote		11,475 0 0
Repayment of expenses charged under—		
(1.) Incidental expenses	18 1 6	
(2.) Special researches	23 15 10	
(3.) Observatories	3 19 11	
		45 17 3
Supply of Weather Information:		
D.W. Charts and Forecasts	181 6 8	
6 p.m. Charts	18 15 0	
Information for Press Agencies, &c.	65 0 10	
Telegrams	251 8 9	
Miscellaneous data	7 3 0	
		523 14 3
Sale of Instruments, &c.:		
Royal Navy account	2 0 0	
Mercantile Marine account	38 6 5	
		40 6 5
Commission charged on work done for Colonies, &c.		20 2 7
		£13,660 8 5

Expenditure.	£ s. d.	£ s. d.
Administration:		
Payment of Council	750 0 0	
Secretary	600 0 0	
Salaries and wages	594 9 0	
Rent, fuel, and lighting	521 8 0	
Furniture and fittings	222 13 10	
Incidental and contingent expenses	*246 9 1	
Expenses incidental to International Meteorological Congress	11 0 0	
Pensions	32 2 3	
		2,978 2 2
Special Researches		*337 6 7
Land Meteorology:		
Observatories and stations	1,381 9 11	
Discussion and reduction of observations	977 9 4	
		2,358 19 3
Weather Information and Forecasts:		
Telegraphic reports and storm warnings	*1,982 19 2	
Preparation and issue of reports and forecasts	1,227 11 5	
		3,210 10 7
Inspections:		
Salaries and travelling		484 16 9
Ocean Meteorology:		
Discussion and reduction of observations	1,389 4 6	
Expenses incidental to the supply of instruments:		
Proportion for care and issue of instruments	150 0 0	
Royal Navy	407 17 4	
Mercantile Marine	262 5 7	
Distant island and coast stations	15 6 9	
		2,224 14 2
Balance		2,065 18 11
		£13,660 8 5

Liabilities.	£ s. d.	Assets.	£ s. d.
To Council	750 0 0	By cash at Bank	2,321 6 6
„ contracts or work uncompleted	79 1 9	„ „ at Office	79 11 7
„ Post Office (partly estimated)	322 0 0	„ „ at Valencia	50 0 0
„ sundry creditors	420 1 7	„ sundry debtors	211 4 2
„ balance	2,065 18 11	„ H.M. Exchequer	975 0 0
	£3,637 2 3		£3,637 2 3

* Some expenses under these heads not yet brought to account.

Read.—A memorandum from Captain Toynbee reporting that since the last meeting six logs had been received, five of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention in Minutes.
Staff-Commr. E. Scobell Clapp, R.N. H. K. Sturdee, Chief Officer.	L. House Tender "Richmond."	Aug. 7—Dec. 8 1886.	At the Bahamas	1886, p. 64.
Capt. C. M. Dobson	S.S. Durham -	4 Oct. 1885—11 June 1886.	To Mediterranean ports, Philadelphia, and home.	1881, p. 55.
Comr. R.F. Hoskyn, R.N. Lt. F. Bowden-Smith, R.N.	H.M.S. "Myrmidon."	1 July—31 Oct. 1886.	Surveying on Australian Station.	1886, p. 65.
Capt. G. F. Parson -	"Earnock" -	1 Nov. 1885—18 Jan. 1887.	To Sydney, San Francisco, and home.	1885, p. 47.
Capt. W. Spratley -	S.S. "Mozart" -	March 28—20 Dec. 1886.	Monte Video, 3 voyages -	1886, p. 17.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

116, *Victoria Street, February* 9, 1887.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (January 26) were read and confirmed.

Mr. Scott submitted a copy of Part I. of the Atlantic Charts (Minutes, p. 95).

Mr. Scott exhibited specimen charts of the Red Sea data (Minutes, 1885, p. 88), showing separately the data from the Office logs, the P. & O. Co.'s logs, and the logs from Dutch vessels.

It was resolved that all winds and currents be combined, winds to be placed in true position; barometer, temperature of air and sea, and specific gravity to be shown separately, in diagrams; the corrections of instruments to be carefully examined. Separate charts for H.M.S. Remark Books to be prepared.

Read—A memorandum from Captain Toynbee reporting that since the last meeting five logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. S. H. Bolton	S.S. "Helen Newton."	Sept. 11, 1886—Jan. 4, 1887.	Cardiff, Stockholm, Sulina, home.	1884, p. 118.
Capt. A. H. Sargent	"Glenlora" -	Nov. 10, 1885—Jan. 8, 1887.	London, New Zealand, West Coast of America, home.	1885, p. 47.
Capt. George Shearer	Barque "Thetis"	Jan. 21, 1885—Jan. 8, 1887.	London, Adelaide, Portland, Oregon, Dublin.	1884, p. 118.
Capt. D. W. A. Quaile	"Orissa" -	Oct. 29, 1885—Jan. 23, 1887.	London, Adelaide, Newcastle, San Francisco, Bristol.	1885, p. 47.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Authority was granted to order—

300 thermometers "A" account, price 105*l.*

Glass tabulating scales for sunshine records for all the stations, to be prepared by Mr. R. Curtis.

Submitted—The following statements of work during January 1887:—

MARINE ROOM.

February 8, 1887.

Examined 16 new logs

North Atlantic Weather Charts.

Reduced charts to March 10, 1883, forwarded to the lithographer. Two proofs and one revised proof received, and sheets passed for press to February 14, completing Part II.

The reduction of May charts in progress, and those for the month of June prepared for eidographing.

The female clerks engaged on the work of reduction and preparing the charts for reproduction by the lithographer.

General.

Discussion of Red Sea observations.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE,
Marine Superintendent.

Telegraphic (Forecast and Storm Warning) Branch.

(To 31st January 1887.)

Monthly Weather Report, 1886 :—

August, printed and issued. *September* partly revised.

October and *November* in printer's hands.

December tables and rough maps drawn. (Delayed by work of completing Appendices to Weekly Weather Report, &c.)

Weekly Weather Report, 1886.—Appendices II. and III. Proof of first portion (referred to in last Report of work done) received and read over. Second portion just ready for printer; thus completing preparation of the Appendices ordered, Minutes, p. 74.

Quarterly (4th) and Annual Summaries, Appendix I.—Sent to printer.

Weekly Weather Report, 1887—Issued to date, with new columns on first page, and seven new stations for Scotland.

Daily Weather Report.—Issued to date, with title page and frontispiece for 1886, second half.

Checking Daily (3.30 p.m. and 8.30 p.m.) *Forecasts.*—Complete to date.

Checking of Hay Harvest Forecasts, 1886.—Completed.

Diagrams for Weekly Accumulated Temperature for official use in Weekly Weather Report.—Completed.

Mean Temperature and Rainfall Curves for new Scotch stations, for use in Office.—Completed

Temperature at Athens, &c. for M. Wild.—Copied and sent.

List of Gales experienced on British and Irish Coasts from 12th April 1884 to 31st December 1886.—Prepared and handed in.

Examining into Nature of several Partial Gales experienced on British and Irish Coasts during the 15 years, 1871–1885.—One-third done.

Plotting Daily Atlantic Telegrams and examining same.—Done nearly to date. Report prepared on those hitherto received and handed in.

During this month Mr. Brodie was absent for about a week, and Pycock for several days, owing to ill-health.

I have now resumed the practice of attending to the 8 a.m. and 2 p.m. telegrams and forecasts personally during those weeks in which it falls to me to prepare the forecasts issued at 8.30 p.m., as this insures greater accuracy in the work generally.

(Signed) Fredc. Gaster.

Pantagraph Room.

February 1, 1887.

Observatory Returns.—The vapour tension values for each hour, and the daily and five-day means of pressure and temperature, &c. for July 1884, have been calculated and checked, and the hourly values copied for press. The work for August 1884 is now in hand.

Quarterly Weather Report.—The letter-press and tables of Part II., 1878, have been revised and are ready for press, waiting only the receipt of revised proof of plates. The letter-press and plates of Part III., 1878, and Part I., 1879, have been sent to the printer. The drawing of chart plates for Part IV., 1878, and preparation of tables for Part II., 1879, are now in hand.

Harmonic Analysis.—The work of filling up the "result sheets" for the analysis of the temperature curves 1871–1882, is not yet completed. In filling up these sheets some of the arithmetical work has been checked; and, where necessary, notes are made of points connected with the work, which it would be necessary to bear in mind in making any subsequent use of the figures.

Miscellaneous.—The Bunhill Row sunshine cards for October–December, 1886, have been tabulated for the Royal Meteorological Society as usual.

(Signed) R. H. Curtis.

R. H. Scott, Esq. F.R.S.

Examination Room.

February 1, 1887.

Report of work done during January :—

Examinations.

September (1884).—Five *anemograms.*

October (1884).—Two *thermograms*, two *barograms*, five *anemograms.*

Partial examination of the Valencia thermograms and barograms for October–December 1886, for the Registrar General for Ireland.

Weekly examination (on receipt) of curves and documents from all stations.

Reports, &c.

Notes of Errors to Aberdeen, Armagh (anemogram), Falmouth, and Valencia, for September and October 1884, and Kew (anemogram) for September 1884, and *reports thereon* to Council.

Completion of investigation of Falmouth wet-bulb differences (S—T) with *memorandum* on same.

Re Kew barometer differences (S—T), October 1885, and January 1887, with *memorandum* and *tabular statements* thereon.

(Signed) T. E. ALLEN.

Submitted—The following Reports on the forecasts for the month of January, 1887.

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

JANUARY.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	31	58	45	85
,,	b	46	35	40	
,,	c	19	7	13	
,,	d	4	0	2	
Scotland, E.	a	23	50	37	69
,,	b	46	19	32	
,,	c	23	8	16	
,,	d	8	23	15	
England, N.E.	a	35	38	37	73
,,	b	42	31	36	
,,	c	15	8	12	
,,	d	8	23	15	
England, E.	a	46	42	44	75
,,	b	19	42	31	
,,	c	23	12	17	
,,	d	12	4	8	
Midland Cos.	a	38	35	37	73
,,	b	27	46	36	
,,	c	23	12	18	
,,	d	12	7	9	
England, S.	a	23	27	25	79
,,	b	54	54	54	
,,	c	15	12	14	
,,	d	8	7	7	
Scotland, W.	a	15	46	31	75
,,	b	54	35	44	
,,	c	23	8	16	
,,	d	8	11	9	
England, N.W.	a	31	35	33	68
,,	b	42	27	35	
,,	c	23	19	21	
,,	d	4	19	11	
England, S.W.	a	31	42	37	72
,,	b	35	35	35	
,,	c	30	4	17	
,,	d	4	19	11	
Ireland, N.	a	35	54	45	77
,,	b	38	27	32	
,,	c	15	8	12	
,,	d	12	11	11	
Ireland, S.	a	39	46	43	68
,,	b	23	27	25	
,,	c	19	15	17	
,,	d	19	12	15	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	45	71	58	85
,,	b	36	17	27	
,,	c	13	6	9	
,,	d	6	6	6	
Scotland, E.	a	32	65	49	79
,,	b	42	19	30	
,,	c	23	6	15	
,,	d	3	10	6	
England, N.E.	a	45	39	42	81
,,	b	39	39	39	
,,	c	13	16	15	
,,	d	3	6	4	
England, E.	a	61	32	47	84
,,	b	26	49	37	
,,	c	13	19	16	
,,	d	0	0	0	
Midland Cos.	a	52	36	44	85
,,	b	39	42	41	
,,	c	9	19	14	
,,	d	0	3	1	
England, S.	a	52	52	52	89
,,	b	45	29	37	
,,	c	3	19	11	
,,	d	0	0	0	
Scotland, W.	a	42	38	40	73
,,	b	31	35	33	
,,	c	24	10	17	
,,	d	3	17	10	
England, N.W.	a	33	40	37	72
,,	b	37	33	35	
,,	c	17	20	18	
,,	d	13	7	10	
England, S.W.	a	43	37	40	77
,,	b	30	43	37	
,,	c	20	13	16	
,,	d	7	7	7	
Ireland, N.	a	40	52	46	82
,,	b	33	38	36	
,,	c	20	3	11	
,,	d	7	7	7	
Ireland, S.	a	30	48	39	75
,,	b	30	42	36	
,,	c	23	3	13	
,,	d	17	7	12	

SUMMARY.

British Isles	a	31	43	37	74
,,	b	39	35	37	
,,	c	21	10	16	
,,	d	9	12	10	
British Isles	a	43	47	45	80
,,	b	35	35	35	
,,	c	16	12	14	
,,	d	6	6	6	

Submitted:—The following Statement respecting the Records for October 1884, received from the Self-recording Observatories (see Minutes, 21st December, 1868, 20th November, 1876, and 3rd January, 1883):—

	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity
Action of Instrument	Good.	Good.	Good.	Good.*	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient:—										
Due to stoppage of clock	0	0	0	0	0	0	0	0	0	0
„ other causes	0	0	0	0	†2 hrs.	†3 hrs.	‡7 hrs.	‡7 hrs.	0	0
Number of errors discovered:—										
By general examination	0	0	4	1	0	0	0	2	0	6
Results of 40 Remeasurements:—										
Greatest difference	1·0	1·0	1·0	1·0	1·0	1·0	0·0	1·0	1·0	2·0
Mean difference irrespective of sign	0·1	0·3	0·1	0·5	0·1	0·5	0·0	0·3	0·1	0·5
Residual difference (—Meteorological Office)	+0·1	0·0	+0·1	−0·1	−0·1	+0·2	0·0	+0·1	+ 0·1	+0·1
Orientation verified	31st	—	4th	—	6th	--	9th,14th, & 21st.	—	8th	—
RAIN GAUGE:—										
Action of Instrument	Good.		Good.		Fair.		Good.		Good.	
Records deficient:—										
Due to stoppage of clock	0		0		0		0		0	
„ other causes	0		0		0		‡5 hrs.		0	
No. of errors discovered:—										
By general examination	0		0		6		0		0	

	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH:—				
Action of Instrument	Good.	Good.	Good.	Good.
Character of Photography	Do.	Do.	Do.	Indifferent.
Records deficient:—				
Due to stoppage of clock	0	0	0	0
„ failure of light	0	0	0	8 hrs.
„ other causes	0	¶1 hr.	‡2 hrs.	¶1 hr.
Number of errors discovered:—				
In entry of standards	0	1	4	1
„ calculating residuals	0	2	2	0
„ applying	13	0	0	0
By general examination	0	1	**33	3
Results of 40 Remeasurements:—				
Greatest difference	·008	·006	·006	·008
Mean difference irrespective of sign	·004	·003	·002	·003
Residual difference (—Meteorological Office)	+·001	·000	·000	·000
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	·002	·001	·003	·002

	Aberdeen.		Falmouth.		Kew.		Valencia.	
THERMOGRAPH:—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Do.		Do.		Fair.	
Records deficient:—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	1 hr.	1 hr.	3 hrs.	3 hrs.
„ failure of light	0	0	0	0	1 hr.	0	0	3 hrs.
„ imperfectly moistened bulbs	—	0	—	0	—	0	—	16 hrs.
„ partially frozen bulbs	—	0	—	0	—	0	—	0
„ other causes	0	0	0	0	‡4 hrs. §1 hr.	‡4 hrs. §1 hr.	0	0
Number of errors discovered:—								
In entry of standards	0	0	0	0	2	0	0	1
„ maxima and minima	0	—	0	—	2	—	0	—
By general examination	1	0	0	1	1	1	4	6
Results of 40 Remeasurements:—								
Greatest difference	0·2	0·2	0·2	0·5	0·2	0·2	0·3	0·2
Mean difference irrespective of sign	0·1	0·1	0·1	0·2	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	−0·1	0·0	+0·1	−0·1	0·0	−0·1	+0·1	+0·1
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·1	0·2	0·2	0·3	0·2	0·2	0·1	0·3

* Intermittent in low velocities. † Painting instrument. ‡ Cleaning instrument. ¶ Photographic imperfections.
§ Repairing gas-pipes. ** Principally caused by errors in inches.

Reported—That the following cheques had been drawn during the month of January:—

1887.			£	s.	d.
Jan.	1st	For weekly salaries	15	18	6
„	8th	„ „	15	18	6
„	13th	E. Higgs, Office repairs, &c.	5	17	6
„	„	T. De La Rue & Co., sunshine cards	8	15	0
„	„	Tyne Improvement Commissioners, erecting anemometer at North Shields	12	5	8
„	„	Anglo-American Telegraph Co., telegrams	1	7	3
„	„	Postmaster General, telegrams	182	0	0
„	„	A. Buchan, inspections	10	4	0
„	„	Negretti & Zambra, instruments and repairs	186	18	0
„	15th	For weekly salaries	15	18	6
„	22nd	„ „	15	18	6
„	„	Negretti & Zambra, instruments and repairs	5	0	0
„	„	J. A. Curtis, reduction of old R.E. observations	8	4	0
„	„	R. G. Canham „ „	4	12	3
„	„	A. H. Bell „ „	4	16	9
„	„	C. A. Bracey „ „	1	2	6
„	„	A J. Rigby, information for Gen. Maquay	3	9	0
„	29th	For weekly salaries	15	18	6
„	„	R. H. Scott, Secretary	66	13	4
„	„	J. S. Harding, jun. } "Office salaries"	27	15	6
„	„	T. D. Bell }	15	8	4
„	„	J. Sheerman, salary (harmonic analysis)	10	8	4
„	„	J. E. Cullum „ (Valencia Observatory)	18	15	0
„	„	R. H. Curtis } Salaries (discussion, &c. of observations).	22	18	4
„	„	J. A. Curtis }	17	18	4
„	„	T. E. Allen }	16	13	4
„	„	C. H. Thompson }	12	1	8
„	„	S. Call }	11	5	0
„	„	R. G. Canham }	7	1	8
„	„	A. H. Bell }	7	1	8
„	„	F. Gaster } Salaries (preparation, &c. of Weather Reports).	25	15	7
„	„	F. J. Brodie }	17	16	3
„	„	G. G. Francis }	17	6	10
„	„	A. J. Rigby }	16	17	6
„	„	R. Sargeant }	11	14	4
„	„	A. R. Simpkins }	9	16	10
„	„	H. J. Stevens }	8	15	0
„	„	Capt. H. Toynbee } Salaries (discussion, &c. of observations and care of instruments).	33	6	8
„	„	Nav. Lieut. C. W. Baillie, R.N. }	22	18	4
„	„	R. Strachan }	27	15	6
„	„	C. Harding }	22	18	4
„	„	H. Harries }	14	11	8
„	„	W. Allingham }	14	11	8
„	„	W. G. James }	10	16	8
„	„	F. T. Bullen }	9	3	4
„	„	R. F. Wallace }	8	6	8
„	31st	Gas Light & Coke Co., gas	10	9	9
„	„	Bank of England, reports supplied by Stationery Office	76	15	8
„	„	Royal Meteorological Society, observations	29	15	2
„	„	Spottiswoode & Co., rent of private wire	17	0	0
„	„	R. Riviere & Son, labels	1	4	0
„	„	J. S. Harding, jun., petty cash	50	0	0
„	„	F. Gaster, for payment of late evening and Sunday attendances	17	14	4
			£1,223	15	0

116, *Victoria Street, February* 23, 1887.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

PROFESSOR DARWIN.	PROFESSOR STOKES.
MR. GALTON.	MR. STONE.

THE HYDROGRAPHER.

The Secretary was in attendance.

Read—The following letter:—

(M.O. 386.) Kew Observatory, Richmond, Surrey,
February 16, 1887.

DEAR MR. SCOTT,

HEREWITH I beg to hand you my report on the cloud observations made by means of the photo-nephographs at this observatory during the past year. It is accompanied by the following:—

(1.) Tables I. and II. of results of measurements of pictures taken in 1885 and 1886.
(2.) Mounted copies of photographs, being he prints used in the preparation of the receivers for the two years.
(3.) Receivers, projections, and calculations used in the preparation of Tables I. and II.
(4.) Cyclostyle drawings of projector, prepared for the Council at the request of Professor Stokes.

I regret that on account of absence through illness of Mr. McLaughlin, I am unable to append a financial account giving the details of the expenditure.

The negative photographs are retained at the Observatory, waiting instructions of the Council as to their final disposal.

Believe me, &c.
(Signed) G. M. WHIPPLE.

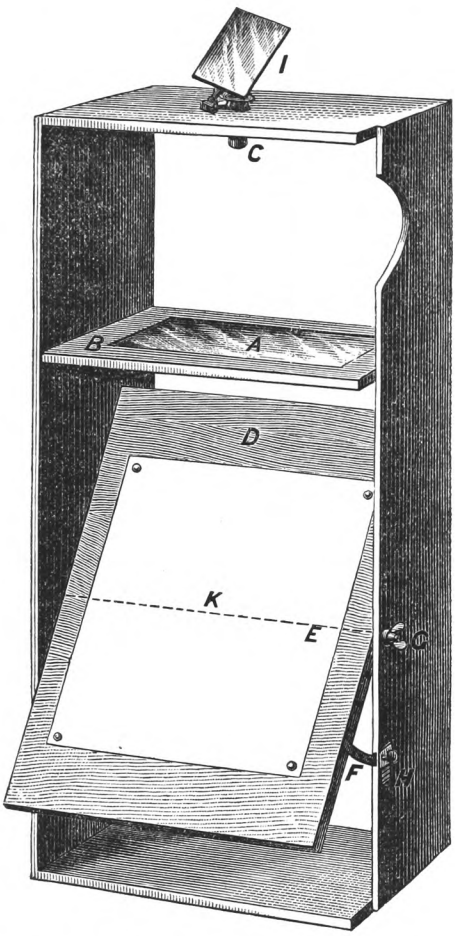
REPORT on the WORK done with the PHOTO-NEPHOGRAPHS at the KEW OBSERVATORY during 1886.
By G. M. WHIPPLE, Superintendent.

THE photo-nephograph results submitted to the Council in the early part of the year were handed to Professor Stokes for consideration, and that gentleman having investigated the matter, decided in future to use a method of determining the cloud altitudes much easier of application than the mathematical method adopted in the previous discussion.

The new method being partly graphic and partly mathematical may be termed the method of *projection*, the old being the method of *calculation*. It may be briefly described as follows:

Four negatives of a group of clouds are procured in the same manner as previously practised, two plates being simultaneously exposed at the two stations and replaced in the cameras immediately by other two, which are exposed on the same clouds a minute or two afterwards, the points of the sky to which the optical axes of the two cameras are directed being determined by the readings of the attached altitude and azimuth circles. Prints are then made from the four negatives, upon which the salient points of the clouds have been already marked and numbered by means of black paint. A sheet of drawing paper a little larger than the prints is next taken and two lines at right angles drawn upon it intersecting at the centre. The four prints are then laid in succession upon this sheet of paper in such a manner that their fiducial lines (after the application of appropriate corrections for instrumental error) shall coincide with the cross lines delineated upon the drawing paper, which is now termed the receiver. The marked points are pricked through, and each cloud-point is then represented upon the receiver as a group of four pin-holes each of which indicates the position of the cloud-point in a different picture of the series. For convenience, and control of the observations, these holes are joined two and two so as to form a quadrilateral figure, the lines joining the holes representing simultaneous observations being drawn in black ink, and those representing observations at the same station in red ink. The black sides represent the effect of parallax, and the red sides that of drift. The quadrilaterals may differ much in size, but except in extreme cases should be approximately parallelograms.

The next stage requires the presence of bright sunshine and an apparatus termed the projector, see figure annexed, the object being to represent the pictures or diagrams as if drawn on a horizontal plane.



The *receiver* (A) is pinned against an aperture in a diaphragm (B) placed in front of a convex lens (C), whilst behind it there is a drawing board (D) hinged on a transverse axis passing through its centre (E), and provided with a divided circle (F), clamp (G), and index (H), by means of which it can be adjusted at any desired inclination to the axis of the lens and plane of the receiver.

It is employed in the following manner :—The sun's rays being directed by means of the mirror (I) upon the lens, cross at its focus and proceed to the surface of the receiver, which is placed at the distance of the focal length of the camera lens (A C). The receiver being perforated at the marked cloud-points, luminous images of the latter are seen upon a sheet of drawing paper (K) placed upon the movable board (D).

The plane of the board is then set by means of its divided circle (F) to the reading of the zenith distance of the axis of the camera at the time of the taking the pictures. The spots of light indicating the cloud-points, or rather the black dots in their centres, being marked off in pencil, represent the projection of the prominent features of the cloud upon the horizontal plane.

The points on the *projection*, as the drawing is now called, are joined together by red and black lines in the same manner as they were previously joined on the *receiver*. If the various adjustments are properly performed, the four points should be at the four angles of a parallelogram, two sides of which will represent the parallax of the cloud-point as seen from the two base stations, whilst the other two sides show the direction and extent of drift of the cloud during the interval which has elapsed between the exposure of the two negatives at the same station. Knowing the astronomical bearing of the cameras and also the mutual bearing of the two stations, it is quite easy to lay down a line across the projection through the point of intersection of its cross lines which will represent the direction of the base drawn on the ground between the two camera stations. The black sides of the parallelograms should be parallel to this line.

The lengths of the lines forming these figures are now measured in millimetres, and from these measurements the cloud heights and rates of motion have been computed on the formulæ given by Professor Stokes.

Instructions to re-commence the cloud photography were received from the Meteorological Council in June 1886, and steps were at once taken to have counterpoises fitted to the cameras, cross levels and new springs to the shutters fixed on, as well as certain minor additions made to the electrical apparatus by Mr. Munro. Printing frames were also arranged for the photographic dating of the plates before development, and one gross of sensitized plates procured from Messrs. Morgan and Kidd. Unfortunately no alteration was made in the apparatus for electrically exposing the lenses, and

consequently, as in the year before, considerable trouble was constantly experienced in getting the two cameras to work together.

An endeavour was made to fix electric bells at the two stations by means of which attention might be called to the telephone, but the arrangement was not successful in its action, and the bells had to be removed.

As the instructions of the Meteorological Council were to devote attention to the cirrus clouds rather than clouds of other kinds, favourable opportunities of photographing were somewhat unfrequent, and during the summer experiments were only made on 16 days. During these occasions 123 plates were exposed, from which 100 successful pictures were obtained.

Of the 23 failures, no less than 12 were due to the failure of the electric exposing apparatus, four to a defective dark slide, four to the intervention of a low cloud, whilst three plates were broken by the photographic printer.

In the 100 successful pictures, 125 points have been marked and selected for treatment, and the resulting cloud heights, direction and velocity of translation, together with the direction and velocity of the wind at the earth's surface, as recorded by the anemograph at the observatory. See Table I.

The results obtained by a re-measurement, on the projection plan, of the cloud pictures taken in 1885, are also appended as Table II.

The number of measured cloud-points averages only four per set of photographs. This is due in great measure to the fact that it was found only possible with the small lens (0·7 inch diameter), provided with the projection apparatus, to utilise points falling within a circle of about 1 inch radius drawn about the centre of the picture, equivalent to an area of approximately 10° square of the sky.

At the same time, this fact reduces the liability to error from shrinkage of the photographic paper, which might prove serious in cases where the cloud-points selected were on the margins of the pictures.

The original intention was to have all prints made by the Cyanotype process, and for this purpose the negatives were placed in the hands of a local photographer, Mr. Meek. That gentleman, however, from pressure of business during the past summer, was unable to carry out the printing satisfactorily, and the negatives were returned to the observatory, where as bright sunshine was deficient during the winter, the prints were made by artificial light, by the photographic assistant on A. G. B. paper.

The following are Professor Stokes's instructions as to the reduction of the observations, which have been employed throughout:—

"Our chief object is to get the velocity and direction of motion, and also the height of the cloud. Very rarely indeed should we care to know its direction or distance.

"The sides of the parallelogram for any cloud-point on the new projection are to be measured. We have then—

$$\text{drift} = \frac{\text{red side}}{\text{black side}} \times 2{,}400 \text{ feet.}$$

"It would be more convenient to express at once the velocity in miles per hour. Thus if the interval between the photographs be one minute, we have—

$$\text{velocity} = \frac{\text{red side}}{\text{black side}} \times 27 \cdot 27 \text{ miles per hour.}$$

"If the interval be, say, 50 or 70 seconds, we have only to add a fifth part of the whole to the above, or deduct a seventh, and so in other cases.

"So much for the velocity. As to the direction, it is given at once by the direction of the red sides, and as the black sides are, or ought to be, parallel to the base line, or rather its projection on a horizontal plane, we have at once the direction relative to the base line. If the direction of the base line should have been already laid down on the drawing, for the sake of verification, it would be a trifle more accurate to refer the direction of motion to that.

"Next for the height. If p be the perpendicular let fall from the focus of the lens on the plane of the paper on the drawing board (I neglect the thickness of the paper)—

$$p = (a + b) \cos. z - b;$$

and then

$$\text{Height} = \frac{p}{\text{black side}} \times 2{,}400 \text{ feet."}$$

In the above formula a denotes the perpendicular distance from the focus of the lens to the surface of the drawing board when the latter is set to zenith distance 0°, and b the distance (7^{mm}) from the surface to the horizontal axis round which the board turns.

The chief difficulty met with by the observers in working is that of satisfactorily identifying the same cloud-point in the four negative photographs forming a set, for if the cloud be low its contour will probably be somewhat different as seen from the two stations, unless it is photographed at a low altitude, and hence at a considerable distance. If the clouds be at a great height above ground, it is necessary to increase the interval between two successive exposures in order satisfactorily to determine the rate of motion, and during such interval, even although it may not exceed two minutes, the change of aspect of the minute configuration of the cloud is frequently such as to lead to great uncertainty in the identification of the selected points of reference.

With regard to the working expenses, the estimate of last year, that the experiments could be carried out at a cost of less than 10*s.* each, has been realised; the total amount expended during the season having been about 48*l.* 18*s.* 4*d.*, and 125 observations having been made, the cost per observation has been 7*s.* 10*d.*

G. M. WHIPPLE.

Kew Observatory, February 16, 1887.

TABLE I.

RESULTS of KEW OBSERVATORY CLOUD OBSERVATIONS, 1886.

Date.	Time.	Wind.		Nature of Cloud.	Number or Letter of Point.	Results.			
		Surface Velocity in Miles per Hour.	Direction at Surface.			Height in Feet.	Velocity in Miles per Hour.	Direction from.	Mount Number.
	H. M.								
June 30 -	2 40	19	N. b. E.	Detached cu.	i	4,027	17·5	N.E.	1
" " -	"	"	"	"	ii	3,638	22·3	"	*
" " -	"	"	"	"	iv	3,525	19·4	"	
" " -	"	"	"	"	v	3,638	24·4	"	
July 7 -	3 32	4	N.N.W.	Cirrus	1	28,950	25·5	S.W.	2
" " -	"	"	"	"	2	25,650	19·9	"	
" " -	"	"	"	"	3	28,050	23·4	"	
" 8 -	3 19	11	N.W. b. N.	Cu.-st.	i	6,633	13·8	N.N.W.	3
" " -	"	"	"	"	ii	7,114	15·8	"	
" " -	"	"	"	"	iii	5,134	12·1	"	
" " -	"	"	"	"	iv	4,686	13·2	"	
" " -	"	"	"	"	v	3,413	18·5	"	
" " -	"	"	"	"	vi	5,002	4·2	"	
" 9 -	11 27	9	N.	Cu.	i	5,111	2·2	N.	4
" " -	"	"	"	"	ii	4,348	4·2	"	
" " -	"	"	"	"	iii	7,194	4·0	"	
" " -	"	"	"	"	iv	4,082	5·8	"	
" " -	"	"	"	"	v	5,000	9·1	"	
" " -	11 43	9	N.W.	Cu.	i	4,840	4·8	N.W.	5
" " -	"	"	"	"	ii	4,079	3·7	"	
" "	"	"	"	"	iii	7,050	16·8	"	
" " -	"	"	"	"	iv	4,497	9·2	"	
" " -	"	"	"	"	v	4,109	4·0	"	
" " -	"	"	"	"	vi	4,294	8·3	"	
" 15	5 2	14	S.W.	Ci.-cu.	1	7,532	23·5	N.N.W.	6
" " -	"	"	"	"	2*	6,276	28·6	"	
" " -	"	"	"	"	3	7,306	12·7	"	
" " -	"	"	"	"	5	7,200	20·8	"	
Aug. 3 -	2 31	8	N.W. b. W.	Cu.-st.	i	4,461	3·8	W.S.W.	7
" " -	"	"	"	"	ii	4,416	3·6	"	
" " -	"	"	"	"	iii	4,576	4·0	"	
" " -	"	"	"	"	iv	4,698	3·3	"	
" 13 -	4 0	26	S.W. b. S.	Cu.	2	3,085	26·3	S.W.	8
" " -	"	"	"	"	3	3,200	23·0	"	
" " -	"	"	"	"	4	1,909	22·2	"	
" " -	"	"	"	"	5	2,215	27·8	"	
" " -	4 6	26	S.W. b. S.	Small cu.	1	5,668	27·2	W.S.W.	9
" " -	"	"	"	"	2	5,954	39·5	"	
" " -	"	"	"	"	3	5,807	40·0	"	
" " -	"	"	"	"	4	4,479	32·9	"	
" 23 -	2 25	9	N.	Ci.-cu.	1	9,550	10·5	S.E.	10
" " -	"	"	"	"	2	9,665	10·0	"	
" " -	"	"	"	"	3	9,223	8·8	"	
" " -	"	"	"	"	4	9,665	11·4	"	
" " -	"	"	"	"	5	8,545	9·0	"	
" " -	3 21	8	N.	Ci.-cu.	i	11,680	19·2	E.S.E.	11
" " -	"	"	"	"	ii	12,220	19·8	"	
" " -	"	"	"	"	iii	12,820	21·6	"	
" " -	"	"	"	"	iv	15,020	23·8	"	*
" " -	"	"	"	"	v	14,600	23·2	"	
" " -	"	"	"	"	vi	13,830	21·1	"	
" " -	"	"	"	"	vii	14,200	23·5	"	
Sept. 1 -	2 51	7	W.N.W.	Ci.-cu.	i	12,030	8·7	W.S.W.	12
" " -	"	"	"	"	ii	12,030	11·0	"	
" " -	"	"	"	"	iii	15,050	9·6	"	
" " -	"	"	"	"	iv	11,440	7·0	"	
" " -	"	"	"	"	vi	22,360	13·6	"	

* From three pictures only.

Results of Kew Observatory Cloud Observations, 1886—*continued.*

Date.	Time.	Wind. Surface Velocity in Miles per Hour.	Wind. Direction at Surface.	Nature of Cloud.	Number or Letter of Point.	Results. Height in Feet.	Results. Velocity in Miles per Hour.	Results. Direction from.	Mount Number.
	H. M.								
Sept. 7 -	3 18	9	W.S.W.	Str.	i	2,417	11·3	W.S.W.	13
" " -	"	"	"	"	ii	2,787	13·2	"	
" " -	"	"	"	"	iii	2,417	10·4	"	
" " -	3 37	7	W.	"	i	2,007	6·2	S.W.	14
" " -	"	"	"	"	ii	1,686	3·3	"	
" " -	"	"	"	"	iii	1,213	2·7	"	
" " -	"	"	"	"	iv	1,840	6·8	"	
" " -	"	"	"	"	v	1,904	5·2	"	
" 11 -	0 11	14	S.S.W.	Ci.	i and ii	59,990	89·4	W.N.W.	15
" " -	"	"	"	"	iii	55,990	88·3	"	
" " -	"	"	"	"	iv and v	64,620	96·2	"	
" " -	"	"	"	"	vi	64,620	105·3	"	
" " -	"	"	"	"	vii	42,000	72·1	"	
" " -	11 53	14	S.S.W.	Cu.-str.	1	5,302	22·2	S.S.W.	16
" " -	"	"	"	"	2	5,560	25·3	"	
" " -	"	"	"	"	3	3,832	19·1	"	
" 20 -	3 28	10	N.	Cir.-cu.	i	23,440	10·6	S. to S.E.	17
" " -	"	"	"	"	ii	22,910	8·7	"	
" " -	"	"	"	"	iii	21,920	7·9	"	
" " -	"	"	"	"	iv	19,760	12·5	"	†
" " -	"	"	"	"	v	19,760	10·7	"	
" " -		"	"	"	vi	19,380	13·3	"	
" " -	"	"	"	"	vii	17,680	10·5	"	
" " -	3 39	12	N.N.E.	Cir.-cu.	2	14,310	10·9	E.S.E.	18
" " -	"	"	"	"	4	11,150	7·3	"	
" " -	"	"	"	"	5	11,150	3·5	"	
" " -	"	"	"	"	1	15,360	8·9	"	
" " -	"	12	N.N.E.	Cir.-cu.	i	15,800	6·6	E.S.E.	
" " -	"	"	"	"	ii	14,050	7·8	"	
" " -	"	"	"	"	iii	12,440	5·9	"	
" 22 -	10 43	24	N.E.	Ci.	i	57,990	21·8	S. to S.E.	19
" " -	"	"	"	"	iii*	34,800	24·0	"	
" " -	"	"	"	"	iv*	26,770	10·1	"	†
" " -	"	"	"	"	v	43,500	19·1	"	
" " -	"	"	"	"	vi*	38,680	29·1	"	
" " -	10 52	24	N.E.	Ci.	i	40,360	16·7	S. to S.E.	20
" " -	"	"	"	"	ii	31,720	13·1	"	
" " -	"	"	"	"	iii	73,990	30·7	"	
" " -	"	"	"	"	iv	37,000	13·7	"	
" " -	"	"	"	"	v	40,360	6·5	"	
" " -	"	"	"	"	vi	34,160	9·5	"	*†
" " -	"	"	"	"	1	37,000	13·7	"	
" " -	"	"	"	"	2	63,430	35·1	"	
" " -	"	"	"	"	3	34,160	14·2	"	
" " -	"	"	"		6	44,400	24·5	"	
" 29 -	4 20	21	S.W.	Ci.-str.	1	3,902	10·2	W.	21
" " -	"	"	"	"	2	4,094	9·9	"	†
" " -	"	"	"	"	3	4,442	10·5	"	
" " -	4 39	19	S.W.	Ci.-str.	i	3,469	7·5	W.	22
" " -	"	"	"	"	ii	3,728	7·5	"	
" " -	"	"	"	"	iii	3,728	7·6	"	†
" " -	"	"	"	"	iv	3,129	7·1	"	
Oct. 4 -	2 48	8	S.S.E.	Ci.	i	59,360	65·4	S.S.W.	23
" " -	"	"	"	"	ii	52,380	56·8	"	
" " -	"	"	"	"	iv	46,870	48·4	"	
" " -	"	"	"	"	v	46,870	50·1	"	
" " -	"	"	"	"	vi	30,700	37·6	"	
" " -	2 27	11	S.E.	Ci.	1	40,470	57·7	S.S.W.	24
" " -	"	"	"	"	ii	45,230	76·5	"	
" " -	"	"	"	"	iii	54,920	85·7	"	
" " -	"	"	"	"	iv	59,140	100·0	"	
" " -	"	"	"	"	v	42,720	72·5	"	
Nov. 4 -	3 17	12	S.W.	Cir.-st.	i	24,250	24·7	W.	25
" " -	"	"	"	"	ii	20,090	25·2	"	
" " -	"	"	"	"	iii	21,310	24·8	"	
" " -	"	"	"	"	iv	21,310	23·0	"	
" " -	"	"	"	"	v	27,050	38·5	"	
" " -	"	"	"	"	vi	15,990	27·9	"	

* Clouds apparently rotating.
† From three pictures only.

Table II.

Results of Kew Observatory Cloud Observations, 1885.

Date.	Time.	Wind.		Nature of Cloud.	Number or Letter of Point.	Results.			
		Surface Velocity in Miles per Hour.	Direction at Surface.			Height in Feet.	Velocity in Miles per Hour.	Direction from.	Mount Number.
July 6	H. M. 3 12	9	S.W.	Small detached cum.	α	12,840	25·8	S.W.	1
„ „	„	„	„	„	β	13,980	27·3	„	
„ 13	4 25	8	W. by S.	Detached stratus	α	8,432	3·0	S.S.W.	2
„ „	„	„	„	„	β	8,026	3·9	S.	
„ „	„	„	„	„	γ	8,958	4·1	S.S.W.	
„ 17	3 1	8	N.W.	Cir.-c.	i	5,412	12·5	W.N.W.	3
„ „	„	„	„	„	ii	5,576	17·2	„	
„ „	„	„	„	„	iii	5,704	19·7	„	
„ 20	6 36	8	W. by S.	Cir.-st.	1	7,861	16·5	N.W.	4
„ „	„	„	„	„	2	(13,474)?	(15·1)?	„	
„ „	„	„	„	„	3	8,293	19·5	„	
„ „	6 43	8	W. by S.	Cir.-c.	α	8,574	21·7	N.N.W.	5
„ „	„	„	„	„	β	5,772	11·9	„	
„ „	„	„	„	„	γ	5,624	12·9	„	
Aug. 4	4 35	18	E. by N.	Cir.-c.	1	11,090	18·7	S.S.W.	6
„ „	„	„	„	„	2	11,920	14·5	„	
„ „	„	„	„	Cir.-st.	3	34,220	71·0	S.S.E.	
„ „	4 40	18	E. by N.	Cir.-st.	i	54,651	92·8	S.	7
„ „	„	„	„	„	ii	64,580	117·1	„	
„ „	„	„	„	„	iii	71,040	124·7	„	
„ „	„	„	„	„	iv	64,580	109·7	„	
„ 11	3 46	25	S.W.	Cu.	α	8,882	29·8	W.S.W.	8
„ „	„	„	„	„	β	9,024	27·1	„	
„ 13	3 19	15	W.N.W.	Cu.	ii	8,642	27·8	W.N.W.	9
„ „	„	„	„	„	iii	8,348	30·7	„	
„ „	„	„	„	„	iv	9,121	30·8	„	
„ 14	3 30	5	S.S.W.	Ci.-cu.	α	5,883	7·8	N.N.E.	10
„ „	„	„	„	„	β	6,362	8·0	„	
„ „	„	„	„	„	γ	5,883	3·1	„	
„ „	„	„	„	„	δ	5,883	6·8	„	
„ 20	3 9	10	N.N.W.	Ci.-st.	i	9,232	23·6	N.	11
„ „	„	„	„	„	ii	7,891	22·8	„	
„ „	„	„	„	„	iii	7,355	26·1	„	
„ „	„	„	„	„	iv	7,233	26·0	„	
Sept. 4	4 8	11	S.W. by S.	Ci.-st.	i	29,710	61·0	S.	
„ „	„	„	„	„	ii	24,000	49·3	„	
„ 5	1 1	20	S.W. by S.	Cu.	α	8,915	26·6	W.	
„ „	„	„	„	„	β	11,340	22·3	„	
„ „	„	„	„	„	δ	12,080	40·5	„	
„ 8	3 32	15	W. by S.	Ci.-st.	α	15,520	30·0	W.	14
„ „	„	„	„	Ci.-cu.	β	23,280	45·0	„	
„ „	„	„	„	Ci.-st.	γ	9,131	24·1	„	
„ „	„	„	„	„	δ	10,350	26·6	„	
„ „	„	„	„	„	ϵ	13,700	28·1	„	
„ 17	4 29	11	N.N.E.	Ci.-c.	α	8,666	13·2	W.N.W.	15
„ „	„	„	„	„	β	8,666	14·1	„	
„ „	„	„	„	„	i	9,550	15·2	„	
„ „	„	„	„	„	ii	9,086	11·3	„	
„ „	„	„	„	„	iii	9,358	17·9	„	
„ 25	10 45	12	N.W.	Ci.-s.	i	4,351	16·2	N.	16
„ „	„	„	„	„	ii	4,800	13·5	„	
„ 26	11 41	9	N.	Ci.-c.	α	16,100	13·4	S.W.	17
„ „	„	„	„	„	β	17,650	19·0	„	
„ „	„	„	„	„	γ	17,650	21·1	„	
„ „	„	„	„	„	δ	17,650	20·0	„	
„ „	11 52	9	N.	Ci.-c.	α	11,720	10·0	W.S.W.	18
„ „	„	„	„	„	β	12,820	13·1	„	
„ „	„	„	„	„	γ	13,680	10·9	„	
„ „	„	„	„	„	δ	13,030	9·2	„	
„ 28	10 54	9	N.W.	Cu.	i	3,229	10·7	N.W.	19
„ „	„	„	„	„	ii	3,456	13·3	„	
„ „	„	„	„	„	iii	3,086	12·7	„	

Results of Kew Observatory Cloud Observations, 1885—*continued.*

Date.	Time.	Wind.		Nature of Cloud.	Number or Letter of Point.	Results.			
		Surface Velocity in Miles per Hour.	Direction at Surface.			Height in Feet.	Velocity in Miles per Hour.	Direction from.	Mount Number.
	H. M.								
Nov. 2 -	10 2	8	S.W. by W.	Detached stratus	α	28,390	44·8	N.N.E.	20
„ „ -	„	„	„	„	β	29,220	46·5	„	
„ „ -	„	„	„	„	γ	24,840	41·2	„	
„ „ -	„	„	„	„	δ	30,100	48·4	„	
„ „ -	10 37	8	S.W. by W.	Cirrus	i	28,500	44·3	N.N.E.	21
„ „ -	„	„	„	„	ii	33,790	50·0	„	
„ „ -	„	„	„	„	iii	21,715	34·0	„	
„ „ -	„	„	„	„	iv	17,885	30·0	„	

Mr. Scott was instructed to obtain from Mr. Whipple some of the negatives. (P.C. 438.)

Read—A letter (No. 410) from Professor Mascart, stating that the cost of the telegrams transmitted from Paris to London (Minutes, p. 98) had been fr. 180.50 for the months of December and January, and that the sum of 200 francs had to be deposited with the French Telegraphic Administration as a guarantee for the payment of such telegrams.

Resolved—That these amounts, viz., 380.50 francs, be paid.

Read—The following letter:—

(M.O. 366.)

Bureau Central Météorologique, Paris,
le 11 Fevrier, 1887.

Mon cher Monsieur Scott,

Je vous fais adresser par la poste deux exemplaires du Projet de Tables.

Malheureusement, cela coutera beaucoup plus que je ne l'avais cru d'abord. L'exemplaire des tables définitives ne peut guère être vendu moins de 35 francs. Il aura environ 400 pages remplies de chiffres et de tableaux.

En outre j'estime que les frais de calcul atteindront presque 3,000 fr. qu'il s'agirait de répartir équitablement entre les différents Instituts. J'avais pensé qu'on pourrait demander—

France - -		
Angleterre - -	400	1,600 fr.
Allemagne - -		
Russie - -		
Autriche - -	350	700 „
Italie - -		
Suède - -		
Norvége - -		
Danemark - -	100	700 „
Pays Bas - -		
Espagne - -		
Portugal - -		
		3,000 „

Cette subvention serait donnée dans forme d'achat d'exemplaires de luxe. En les supposant à 45 fr., on aurait pour les frais de calcul un bénéfice de 10 fr. par exemplaire, et la souscription des Instituts devrait être de 300 exemplaires. Pour vous, par exemple:

ce serait 40 exemples @ 45 fr. - - 1,800 fr.

Que penseriez-vous de cette combinaison et vous semble-t-il qu'elle ait chance d'aboutir?

(Signed) E. Mascart.

Mr. Scott stated that at the Congress of Rome (1879) it had been decided to be desirable that new authoritative Meteorological Tables should be compiled, and that subsequently Professor Wild and Professor Mascart had undertaken the preparation of the draft forwarded with the foregoing letter.

Professor Darwin and Professor Stone were requested to examine into the subject.

Read—Letter 358 from the Chief Signal Office, announcing the death of General W. B. Hazen.

The Secretary was instructed to write a letter of condolence in reply. (P.C. 451.)

Submitted—The following Statement respecting the Records for November 1884, received from the Self-recording Observatories (see Minutes, 21st December 1868, 20th November 1876), and 3rd January 1883 :—

	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action of Instrument	Good.	Good.	Good.	Indifft.*	Good.	Good.	Good.	Good.	Good.	Good.
Records deficient:—										
Due to stoppage of clock	0	0	0	0	0	0	0	0	0	0
„ other causes	0	0	0	0	0	0	0	0	0	0
Number of errors discovered:—										
By general examination	0	0	0	4	0	0	4	0	1	3
Results of 40 Remeasurements:—										
Greatest difference	1·0	1·0	1·0	1·0	1·0	1·0	1·0	2·0	1·0	2·0
Mean difference irrespective of sign	0·0	0·4	0·1	0·4	0·1	0·5	0·1	0·4	0·0	0·5
Residual difference (— Meteorological Office)	0·0	−0·1	+0·1	+0·2	0·0	+0·2	−0·1	0·0	0·0	+0·1
Orientation verified	22nd	—	7th	—	7th	—	5th	—	3rd	—
RAIN GAUGE:—										
Action of Instrument	Good.		Good.		Good.		Good.		Good.	
Records deficient:—										
Due to stoppage of clock	0		0		0		0		0	
„ other causes	0		0		0		0		0	
Number of errors discovered:—										
By general examination	0		0		0		4		0	

	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH:—				
Action of Instrument	Good.	Good.	Bad.	Good.
Character of Photography	Do.	Do.	Good.	Indifferent.
Records deficient:—				
Due to stoppage of clock	0	0	0	0
„ failure of light	0	0	0	0‡
„ other causes	1 hr.†	0	0	0
No. of errors discovered:—				
In entry of standards	0	0	2	0
„ calculating residuals	0	1	0	0
„ applying „	0	0	1	0
By general examination	0	1	1	6
Results of 40 Remeasurements:—				
Greatest difference	0·008	0·008	0·006	0·008
Mean difference irrespective of sign	0·003	0·003	0·002	0·004
Residual difference (— Meteorological Office)	−0·001	+0·001	0·000	0·000
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	0·002	0·001	0·002	0·001

	Aberdeen.		Falmouth.		Kew.		Valencia.	
THERMOGRAPH:—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Do.		Do.		Indifferent.	
Records deficient:—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	0	0	0	0
„ failure of light	0	0	0	0	0	0	0	0
„ imperfectly moistened bulbs	—	0	—	0	—	0	—	0
„ partially frozen bulbs	—	5 hrs.	—	0	—	9 hrs.	—	0
„ other causes	1 hr.†	1 hr.†	0	0	0	0	0	0
Number of errors discovered:—								
In entry of standards	0	0	0	0	1	1	0	3
In maxima and minima	0	—	1	—	2	—	0	—
By general examination	0	0	2	0	2	1	2	5
Results of 40 Remeasurements:—								
Greatest difference	0·2	0·2	0·2	0·2	0·2	0·2	0·4	0·4
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·2	0·1
Residual difference (— Meteorological Office)	−0·1	−0·1	+0·1	−0·1	0·0	0·0	+0·2	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·1	0·2	0·1	0·2	0·1	0·2	0·1	0·2

* Intermittent in low velocities

† Making new gas connections.

‡ Light very intermittent at times.

Read—The following letter:—

(M.O. 335.)

Science and Art Department, South Kensington, S.W.,
February 8, 1887.

SIR,

I AM directed by the Chairman of the Solar Physics Committee to inform you that the Committee has now for some years been engaged in an attempt to collect complete data with reference to all changes which take place on the surface of the sun, and that as a result of their endeavour an almost perfect daily record is now obtained of some of these phenomena. The Committee have considered the question as to whether it is now desirable to take any steps which would enable them ultimately to investigate, with sufficient thoroughness, the nature and extent of the supposed relations between solar variability and the meteorology of the earth. In connection with this I am to state that the Committee considered, and are still considering, various questions connected with actinometry. They desire me to ask you to be good enough to lay this communication before the Meteorological Council with the view of obtaining the opinion of the Council on these subjects, and to ask whether the Council consider it desirable to endeavour to concert a plan for such investigations, either independently or in connection with the Solar Physics Committee.

I have, &c.
(Signed) FRANK REDE FOWKE,
Secretary, Solar Physics Committee

The Secretary of the Meteorological Council,
116, Victoria Street, S.W.

Read—A memorandum from Captain Toynbee reporting that since the last meeting five logs had been received, four of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. E. C. Bennett	"Thessalus" -	Jan. 21, 1886—Jan. 20, 1887.	To Sydney, San Francisco, and home.	1885, p. 92.
Capt. P. J. Irving -	S.S. "Republic"	March 19, 1886—Feb. 14, 1887.	Liverpool and New York (five voyages).	1885, p. 109.
Capt. W. G. North	S.S. "Tiger"	Oct. 5, 1886—Feb. 5, 1887.	Hull, Stockholm, and Hamburgh.	1886, p. 65.
Capt. T. Potter -	S.S. "Sulina" -	May 6—Nov. 23, 1886.	Philadelphia, Baltimore, Cronstadt, Boston.	1886, p. 65.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Mr. Scott stated that it was desirable that Commissionaire Forder, at present engaged till 4 p.m. at 21*s.* per week wages, should be engaged till 5 p.m., and that his wages be increased to 24*s.* per week (Letter No. 437).—Approved.

116, *Victoria Street, March* 9, 1887.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. GALTON.	MR. STONE.
PROFESSOR STOKES.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last two meetings (February 9 and 23) were read and confirmed.

The subject of the cloud measurements (Minutes, p.) was considered, and it was resolved to have independent measurements made of some of the pictures.

Mr. Scott was instructed to send the following reply to Professor Mascart (Minutes, p. 123), (P.C. 633) :—

The Council having examined the tables proposed to be printed by the International Meteorological Committee, are of opinion that the estimated amount of the charge which would have to be met by this Office, if the plan be adopted, is more considerable than they would be justified in incurring for such an object, viewing the matter with reference to any probable advantage that might be obtained in facilitating the work carried on in this Office. At the same time the Council would not on this account decline to co-operate in the matter if they were satisfied that there was a general desire on the part of the Administrations represented by the International Committee to accept the proposals now before them, and to meet their share of the charge as indicated. The Council will, therefore, be prepared to reconsider the matter, should the International Committee hereafter be in a position to comply with the condition above stated.

Read—Letters 415 and 525 from Colonel O'Brien, Governor of Heligoland, giving particulars as to the site for the proposed anemometer (Minutes, p. 65).

Mr. Scott was instructed to order two anemometers of the same pattern as that at Scilly (Minutes, 1878, p 43), one for Heligoland, the other for Mountjoy Observatory, Phœnix Park (Minutes, p. 59, Letter 2414/86).

Reported—That the daily telegraphic messages from Valencia to Washington (Minutes, p. 4), had been stopped on the 4th instant, at the request of the Chief Signal Office (Letter 509).

Read—(Letter 480) from Mr Bayard, stating that his calculations for the year 1879 were completed (Minutes, p. 52), and requesting a copy of the Hourly Readings for 1880.—Approved.

Read—A memorandum from Captain Toynbee reporting that since the last meeting 8 logs had been received, 5 of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last Mention on Minutes.
Capt. A. W. Adamson. Log kept by H. S. Blackburne, Esq. (Chief Officer).	S.S. "Brindisi"	Dec. 2, 1886—Feb. 28, 1887.	London, Madras, Calcutta, and home.	1886, p. 48.
Capt. Henry Bright	Bq. "Beltana"	March 12, 1886—Feb. 27, 1887.	London, Australia, and home.	—
Capt. T. Leportier	S.S. "Mira"	Dec. 3, 1886—Feb. 23, 1887.	Liverpool, Calcutta, and home.	1871, p. 47.
Capt. J. F. L. P. Maclear, R.N.	H.M.S. "Flying Fish."	July 12—Nov. 12, 1886.	Surveying on the Australian station.	1886, p. 81.
Lieut. W. O. Lyne, R.N.				
Capt. Fredk. West	S.S. "Port Adelaide."	Feb. 23, 1886—Feb. 9, 1887.	London, Australia, China, New York, and home.	—

Mr. Scott was instructed to present the Charts (O. 27) to Captain Bright; (O. 32) to Mr. H. S. Blackburne; (O. 43) to Captain West; and to convey the best thanks of the Council to the other observers.

Submitted—The following statements of work during February 1887 :—

MARINE ROOM.

March 8, 1887.

Examined 10 new logs and 1 lighthouse register.

North Atlantic Weather Charts.

Forwarded to the lithographer reduced charts to March 31, and received proofs of lithographed sheets to February 26, 1883.

Advancing the reduction and preparation for photo-lithography of charts for May.

Obtaining lowest barometer readings near centre of disturbances in June.

Progress made in the preparation of July charts for eidographing.

One copy of Part I. (33 sheets) coloured in graduated shades of red and blue representing various intensities of high and low pressure systems.

General.

Discussion of Red Sea data.

(Signed) CHAS. HARDING.

The Marine Superintendent.

Forwarded for the information of the Council.

(Signed) HENRY TOYNBEE.

TELEGRAPHIC (FORECAST AND STORM WARNING) BRANCH.
(To 28th February 1886.)

Monthly Weather Report, 1886 :—
September, printed and issued.
October, partially revised.
November, in proof.
December, tables prepared and rough maps drawn.
Monthly Weather Report, 1887 :—
January, tables prepared and rough maps drawn.
Weekly Weather Report, 1886.—Appendices I., II. and III. completed, in type, revised and returned to printer "for press." Title page, preface, and table of missing reports printed, revised and returned "for press." These tables, &c. complete the Weekly Report for 1886 (Minutes, pp. 74 and 75).
Weekly Weather Report, 1887.—All promptly issued to date. Preparation of Appendices ordered (Minutes, pp. 74 and 75) for this year's report has already been commenced.
Daily Weather Report, 1887.—Issued promptly to date, with "correction and addition" sheet and summary for *January*.
Checking of Daily (3 30 p.m. and 8.30 p.m.) *Forecasts*.—Done to date.
Inquiry into nature of "Severe partial Gales" felt on British coasts during 15 years 1871–85. Two thirds done.
Plotting Daily Atlantic Telegrams.—Kept up to date.
Preparation of Mean Monthly Values for Bright Sunshine in five years 1881–5 at *York* and also in wheat and grazing districts. Completed and handed in.

(Signed) FREDC. GASTER.

PANTAGRAPH ROOM.

March 1, 1887.

Observatory Returns.—The calculation of the mean results and of the hourly vapour tension values for August 1884, and the copying of the hourly readings, &c., has been completed and sent to press. The proof of the July sheets has been read and passed for press.
Quarterly Weather Report.—The revise of Part II. 1878 has been completed and the whole passed for press. The tables for Part II. 1879, have been completed, and the "General Summary" for the quarter is well advanced. The chart plates for Part IV 1878 are also nearly complete.
Harmonic Analysis.—The work of filling up the "Result sheets" containing the results of the analysis of the 12 years' temperature curves 1871–82 has been completed. Similar sheets for the barometer work, as far as it has been carried, are now being prepared.
Miscellaneous.—A memorandum dealing with an alleged error in the Aberdeen barogram scale-value has been prepared; this necessitated the measurement of a good many barograms and occupied some days. Another memorandum was got out relative to the ruling on the tabulation sheets in use. More time than usual has been taken up with questions relating to sunshine recorders, their adjustment, &c.; and a year's cards from Oswaldkirk have been tabulated for comparison with the observer's returns, and a table of means and percentage, &c. prepared.

(Signed) R. H. CURTIS,

R. H. Scott, Esq., F.R.S.

EXAMINATION BRANCH.

SIR, March 1, 1887.

REPORT of the work done during the month of February :—

Examinations.

October (1884).—One *thermogram*, one *barogram*.
November (1884).—Three *thermograms*, three *barograms*, four *anemograms*.
December (1884).—Three *thermograms*, three *barograms*, four *anemograms*.
Weekly examination (on receipt) of curves and documents from all stations.

Reports.

Notes of Errors to Aberdeen, Armagh (anemogram), Falmouth, and Valencia for November, 1884, and report thereon to Council.
Monthly reports of work done for January (copy) and February 1887.

Miscellaneous.

The consideration and preparation of Forms 21, 22, 23, 27, 28, 29, 32, 32A.

(Signed) T. E. ALLEN.

Submitted—The following report on the forecasts for February 1887 :—

The letters used have the following signification :—

a complete success.
b partial (*i.e.*, more than half) success.
c partial failure.
d total failure.

FEBRUARY.

3.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Fore ast.	Percentage of Success a + b.
Scotland, N.	a	38	50	44	75
,,	b	29	33	31	
,,	c	25	13	19	
,,	d	8	4	6	
Scotland, E.	a	54	54	54	81
,,	b	25	29	27	
,,	c	21	9	15	
,,	d	0	8	4	
England, N.E.	a	50	50	50	86
,,	b	42	29	36	
,,	c	4	17	10	
,,	d	4	4	4	
England, E.	a	58	42	50	75
,,	b	29	21	25	
,,	c	13	16	15	
,,	d	0	21	10	
Midland Cos.	a	42	50	46	75
,,	b	33	25	29	
,,	c	25	8	17	
,,	d	0	17	8	
England, S.	a	58	50	54	81
,,	b	25	29	27	
,,	c	17	8	13	
,,	d	0	13	6	
Scotland, W.	a	42	42	42	76
,,	b	38	29	34	
,,	c	16	21	18	
,,	d	4	8	6	
England, N.W.	a	42	50	46	75
,,	b	33	25	29	
,,	c	25	13	19	
,,	d	0	12	6	
England, S.W.	a	58	33	46	69
,,	b	13	33	23	
,,	c	21	13	17	
,,	d	8	21	14	
Ireland, N.	a	29	29	29	69
,,	b	42	38	40	
,,	c	17	21	19	
,,	d	12	12	12	
Ireland, S.	a	42	17	30	61
,,	b	16	46	31	
,,	c	21	16	18	
,,	d	21	21	21	

8.30 P.M.

Districts.		Percentages. Wind.	Weather.	Average Forecast.	Percentage of Success a + b.
Scotland, N.	a	50	71	61	82
,,	b	25	18	21	
,,	c	14	0	7	
,,	d	11	11	11	
Scotland, E.	a	50	61	56	84
,,	b	36	21	28	
,,	c	11	7	9	
,,	d	3	11	7	
England, N.E.	a	54	50	52	91
,,	b	46	32	39	
,,	c	0	14	7	
,,	d	0	4	2	
England, E.	a	57	36	47	86
,,	b	39	39	39	
,,	c	4	14	9	
,,	d	0	11	5	
Midland Cos.	a	43	46	45	89
,,	b	53	36	44	
,,	c	4	7	6	
,,	d	0	11	5	
England, S.	a	64	50	57	93
,,	b	32	39	36	
,,	c	4	7	5	
,,	d	0	4	2	
Scotland, W.	a	46	54	50	72
,,	b	22	21	22	
,,	c	25	18	21	
,,	d	7	7	7	
England, N.W.	a	57	54	56	81
,,	b	22	29	25	
,,	c	14	3	9	
,,	d	7	14	10	
England, S.W.	a	64	57	61	84
,,	b	22	25	23	
,,	c	7	0	4	
,,	d	7	18	12	
Ireland, N.	a	57	43	50	88
,,	b	29	46	38	
,,	c	11	4	7	
,,	d	3	7	5	
Ireland, S.	a	47	32	40	84
,,	b	39	50	44	
,,	c	7	7	7	
,,	d	7	11	9	

SUMMARY.

British Isles	a	47	42	45	75
,,	b	29	31	30	
,,	c	19	14	16	
,,	d	5	13	9	
British Isles	a	54	51	53	85
,,	b	33	32	32	
,,	c	9	7	8	
,,	d	4	10	7	

Submitted—The following Statement respecting the Records for December 1884, received from the Self-recording Observatories (see Minutes, 21st December 1868, and 20th November 1876, and 3rd January 1883):—

	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.
Action of Instrument	Good.	Good.	Good.	*Indifft.	‡	‡	Good.	Good.	Good.	Good.
Records deficient:—										
Due to stoppage of clock	0	0	0	0	0	0	0	0	0	0
„ other causes	0	0	0	0	0	0	0	0	0	0
Number of errors discovered:—										
By general examination	0	0	3	7	0	0	3	2	0	3
Results of 40 Remeasurements:—										
Greatest difference	1·0	1·0	1·0	1·0	—	—	0·0	1·0	1·0	2·0
Mean difference irrespective of sign	0·0	0·3	0·1	0·4	—	—	0·0	0·4	0·1	0·8
Residual difference (—Meteorological Office)	0·0	0·0	0·0	0·0	—	—	0·0	0·0	0·0	+0·1
Orientation verified	27th	—	—	—	—	—	4th	—	12th	—

	Aberdeen.	Armagh.	Falmouth.	Kew.	Valencia.
RAIN GAUGE:—					
Action of Instrument	Good.	Good.	Good.	Good.	Good.
Records deficient:—					
Due to stoppage of clock	0	0	0	0	0
„ other causes	0	0	0	0	0
Number of errors discovered:—					
By general examination	0	1	2	9	0

	Aberdeen.	Falmouth.	Kew.	Valencia.
BAROGRAPH:—				
Action of Instrument	Good.	Good.	Bad.	Good.
Character of Photography	Do.	Fair.	Good.	Indifferent.
Records deficient:—				
Due to stoppage of clock	0	0	0	0
„ failure of light	0	0	0	0
„ other causes	0	0	0	
Number of errors discovered:—				0
In entry of standards	0	2	1	0
„ calculating residuals	0	2	1	0
„ applying „	1	0	0	10
By general examination	0	1	‖37	27
Results of 40 Remeasurements:—				
Greatest difference	·007	·011	·012	·009
Mean difference irrespective of sign	·003	·003	·003	·003
Residual difference (—Meteorological Office)	—·001	—·001	·000	·000
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	·002	·002	·003	·002

	Aberdeen.		Falmouth.		Kew.		Valencia.	
THERMOGRAPH:—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Do.		Do.		Fair.	
Records deficient:—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	0	0	0	0
„ failure of light	0	0	0	0	0	0	0	0
„ imperfectly moistened bulbs	—	0	—	0	—	0	—	0
„ partially frozen bulbs	—	42 hrs.	—	0	—	18 hrs.	—	0
„ other causes	§1 hr.	§1 hr.	0	¶1 hr.	0	0	0	0
Number of errors discovered:—								
In entry of standards	0	0	0	0	2	2	1	1
„ maxima and minima	0	—	2	—	5	—	2	—
By general examination	0	0	1	0	3	1	6	2
Results of 40 Remeasurements:—								
Greatest difference	0·2	0·2	0·3	0·3	0·3	0·2	0·3	0·3
Mean difference irrespective of sign	0·1	0·1	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	−0·1	0·0	+0·1	−0·1	−0·1	−0·1	−0·1	0·0
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·1	0·1	0·1	0·2	0·2	0·1	0·1	0·2

* Intermittent at low velocities. † Trace faint. ‡ Instrument dismounted on the 5th.
‖ Principally caused by the omission of the inches. § Water in gas pipes. ¶ Photographic imperfections.

Reported—That the following cheques had been drawn during the month of February :—

1887.					£	s.	d.
Feb. 2nd.	Deutsche Seewarte, telegrams				*18	4	3
„ 5th.	J. S. Harding, jun., payment of weekly salaries				16	2	11
„ 12th.	„ „				15	0	0
„ „	Pall Mall Coal Company, coals				11	0	0
„ 19th.	J. S. Harding, jun., payment of weekly salaries				15	0	0
„ 26th.	„ „				15	0	0
„ 28th.	R. H. Scott, Secretary				66	13	4
„ „	J. S. Harding, jun. } "Office" salaries				27	15	6
„ „	T. D. Bell }				15	8	4
„ „	J. Sheerman, salary (harmonic analysis)				10	8	4
„ „	J. E. Cullum, salary (Valencia Observatory)				18	15	0
„ „	R. H. Curtis	Salaries (discussion, &c. of observations).			22	18	4
„ „	J. A. Curtis				17	18	4
„ „	T. E. Allen				16	13	4
„ „	C. H. Thompson				12	1	8
„ „	S. Call				11	5	0
„ „	R. G. Canham				7	1	8
„ „	A. H. Bell				7	1	8
„ „	F. Gaster	Salaries (preparation, &c. of Weather Reports).			25	15	7
„ „	F. J. Brodie				17	16	3
„ „	G. G. Francis				17	6	10
„ „	A. J. Rigby				16	17	6
„ „	R. Sargeant				11	14	4
„ „	A. R. Simpkins				9	16	10
„ „	H. J. Stevens				8	15	0
„ „	C. W. Heinemann				5	0	0
„ „	Capt. H. Toynbee	Salaries (discussion, &c. of observations and care of instruments).			33	6	8
„ „	Nav.-Lieut. C. W. Baillie, R.N.				22	18	4
„ „	R. Strachan				27	15	6
„ „	C. Harding				22	18	4
„ „	H. Harries				14	11	8
„ „	W. Allingham				14	11	8
„ „	W. G. James				10	16	8
„ „	F. T. Bullen				9	3	4
„ „	R. F. Wallace				8	6	8
„ „	J. H. Woodstock, packing cases				2	10	0
„ „	T. De La Rue & Co., sunshine cards				5	8	11
„ „	P. & O. Steam Navigation Co., freight				2	8	3
„ „	G. A. Gillett, wood, oil, &c.				3	2	10
„ „	M. E. Anderson, colouring N. A. charts				2	0	0
„ „	Post Office, private wire (Office)		22	0 0			
„ „	„ telegrams		141	1 4			
					163	1	4
„ „	J. S. Harding, junr., petty cash				50	0	0
„ „	Paris Meteorological Office, telegrams				†14	19	11
„ „	F. Gaster, for payment of allowances for late evening and Sunday attendance				14	18	0
					£860	8	1

* Payment made by draft on Hamburg.
† „ „ Paris.

116, *Victoria Street, March* 23, 1887.

PRESENT:

LIEUT.-GENERAL STRACHEY IN THE CHAIR.

MR. GALTON.	MR. STONE.
PROFESSOR STOKES.	THE HYDROGRAPHER.

The Secretary was in attendance.

The Minutes of the last meeting (March 9) were read and confirmed.

With reference to the proposed charts of the weather over the North Indian Ocean at the time of the Aden cyclone in June 1885 (Minutes pp. 83 and 96), Mr. Scott submitted a letter from Mr. Blanford (No. 376), stating that the information he possessed was in Dr. Neumayer's hands, and a letter from Dr. Neumayer (No. 631), forwarding this data with some additions from his own office.

Mr. Scott was instructed to prepare the charts, and to endeavour to supplement the data already collected, by information derived from the Admiralty, and from the logs of steamship companies.

Read—The following :—

MEMORANDUM.

Mr. Baillie has the loan of some logs from the "White Star" Line for his Current work, and is likely to have more from other Lines. These logs contain very good meteorological observations in the Pacific, and I shall be glad to know whether the Council wish these observations to be copied before the logs are returned.

Preparing the logs and copying the observations into data-books would occupy about two and a half days of one man's time for a month's log.

Merely copying a month's log would occupy one man about a day, but then the preparing and copying those observations into data books would occupy two and a half more days.

At present we have observations for nearly 29 months only.

(Signed) HENRY TOYNBEE.

Mr. Scott was instructed to have the logs copied, if it was not possible to obtain permission to retain them altogether.

Read—Letter 619 from Professor Mascart requesting a remittance of 800 francs for the cost of transmission of the telegrams from America, up to January 31st.

Resolved—That the sum of 800 francs be paid.

Read—A memorandum from Captain Toynbee reporting that since the last meeting four logs had been received, all of them being "excellent."

Observer.	Ship.	Period.	Voyage.	Last mention on Minutes.
Capt. James Gordon	S.S. "City of Agra."	Dec. 10, 1886—March 5, 1887.	Glasgow, Calcutta and London, viâ Suez.	1886, p. 91.
Capt. W. P. Hughes	"Laomene" -	Aug. 31—Dec. 31 1886.	Liverpool, Calcutta, Mauritius and home.	1885, p. 46.
Comr. W. U. Moore, R.N. Lieut. A. Balfour, R.N.	H.M.S. "Rambler."	Sept. 1—Dec. 31 1886.	Surveying in China Sea	1886, p. 81.
Capt. Mcses Parry, F. R. Met. Soc.	S.S. "Prydain"	June 3 1886—Jan. 20, 1887.	Mediterranean, Baltimore, Odessa, New York, &c.	1886, p. 86.

Mr. Scott was instructed to convey the best thanks of the Council to the above observers.

Submitted:—The following Statement respecting the Records for January 1885, received from the Self-recording Observatories (see Minutes, 21st December 1868, 20th November 1876, and 3rd January 1883):—

	Aberdeen.		Armagh.		Falmouth.		Kew.		Valencia.	
ANEMOGRAPH:—	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity.	Direction.	Velocity
Action of Instrument	Good.	Good.	Good.	Indifft.*	†	†	Good.	Good.	Good.	Good
Records deficient:—										
Due to stoppage of clock	0	0	0	0	—	—	0	0	0	0
„ other causes	0	0	††14 hrs.	††49hrs.	—	—	0	‡1 hr.	0	0
Number of errors discovered:—										
By general examination	0	0	0	5	—	—	9	1	3	4
Results of 40 Remeasurements:—										
Greatest difference	1·0	1·0	1·0	1·0	—	—	3·0	2·0	1·0	2·0
Mean difference irrespective of sign	0·1	0·3	0·0	0·3	—	—	0·2	0·4	0·1	0·6
Residual difference (—Meteorological Office)	0·1	+0·1	0·0	+0·1	—	—	−0·2	+0·1	+0·1	+0·2
Orientation verified	31st	—	21st	—	—	—	7th	—	5th	—
RAIN GAUGE:—										
Action of Instrument	Indifferent.		Good.		Good.		Good.		Good.	
Records deficient:—										
Due to stoppage of clock	0		0		9 hrs.		0		24 hrs.	
„ other causes	0		0		0		‖1 hr.		0	
No. of errors discovered:—										
By general examination	0		1		3		0		11	

	Aberdeen.		Falmouth.		Kew.		Valencia.	
BAROGRAPH:—								
Action of Instrument	Good.		Good.		Bad.		Good.	
Character of Photography	Do.		Fair.		Good.		Indifferent.	
Records deficient:—								
Due to stoppage of clock	0		1 hr.		0		0	
„ failure of light	0		0		0		0	
„ other causes	0		§1 hr.		0		§8 hrs.	
Number of errors discovered:—								
In entry of standards	0		2		0		0	
„ calculating residuals	0		2		4		1	
„ applying	3		0		0		0	
By general examination	0		0		5		3	
Results of 40 Remeasurements:—								
Greatest difference	·007		·007		·007		·009	
Mean difference irrespective of sign	·004		·004		·002		·002	
Residual difference (—Meteorological Office)	−·001		+·001		+·001		·000	
Mean monthly difference between simultaneous Barograph and Standard Barometer readings	·002		·002		·003		·002	
THERMOGRAPH:—								
Action of Instrument	Good.		Good.		Good.		Good.	
Character of Photography	Do.		Do.		Do.		Bad.	
Records deficient:—	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.
Due to stoppage of clock	0	0	0	0	5 hrs.	5 hrs.	0	0
„ failure of light	0	0	0	0	0	0	0	0
„ imperfectly moistened bulbs	—	3 hrs.	—	**60 hrs.	—	0	—	4 hrs.
„ partially frozen bulbs	—	69 hrs.	—	18 hrs.	—	52 hrs.	—	0
„ other causes	0	0	0	0	0	0	0	0
Number of errors discovered:—								
In entry of standards	0	0	0	0	0	0	0	0
„ maxima and minima	0	—	3	—	1	—	1	—
By general examination	0	0	0	0	17	5	0	5
Results of 40 Remeasurements:—								
Greatest difference	0·1	0·1	0·2	0·3	0·2	0·2	0·3	0·3
Mean difference irrespective of sign	0·1	0·0	0·1	0·1	0·1	0·1	0·1	0·1
Residual difference (—Meteorological Office)	0·0	0·0	0·0	−0·1	−0·1	0·0	+0·1	+0·1
Mean monthly difference between simultaneous Thermograph and Standard Thermometer readings	0·1	0·2	0·1	0·2	0·2	0·2	0·1	0·1

* Intermittent at low velocities. † Instrument dismounted. ‡ Photographing observatory ‖ Attaching new pencil.
§ Photographic imperfections. ** Curve 8–9 entirely lost, owing to neglect. †† Owing to frost.

Submitted—The following Report :—

List of Warnings issued to the Coasts of the United Kingdom since the 1st March 1887, naming the Coasts warned, the Signals hoisted, and the Weather experienced while the Signals were flying (Minutes, p. 27).

(1.) Warnings issued.

Day and Hour of Issue.	Coasts warned.	Signal hoisted.	Gales experienced (if any), and approximate Time of Occurrence.	Results. (Class of Warning.*)
1887.				
March 10th, 8 p.m. -	Ireland, S. -	South cone	Strong N.Ely. winds, night of 11th	B
„ „ -	„ E. -	„	„ „ and a fresh N.E. gale at Donaghadee early on 12th.	B
„ „ -	Scotland, E.(Dunrossness to Aberdeen).	North cone	No gales or strong winds reported -	C
„ „ -	„ W. -	„	„ „ „ -	C

The signals were lowered, partly on the 11th, partly on the 12th.

The conditions under which these signals were issued were *very* peculiar, and the forecaster was in considerable doubt as to whether he should warn or not, but finally decided to do so.

1887.				
March 21st, 10 a.m. -	Ireland, S. -	South cone	Sly. gales in afternoon and evening of 21st.	A
„ „ -	„ E. -	„	„ „ „	A
„ 3.15 p.m.	Scotland, W. -	„	Apparently no gale† - -	C
„ „	„ E. -	„	Strong S.Ely. and Sly. winds on 22nd; gale at Wick.	B
„ „	England, N.W. -	„	Strong S.Ely. winds, evening of 21st, followed by moderate Wly. gales on 22nd.	A
„ „	„ W. -	„	„ „ „	A
„ „	„ S.W. -	„	„ „ „	A
„ „	„ E.(Newcastle and Whitby).	„	Apparently no gale† - -	C
„ 7.0 p.m. -	England, S. -	„	Wly., strong on 22nd, gales 23rd -	A
„ „ -	„ S.E. -	„	S.Ely., strong 22nd, W.N.W. gales 23rd.	A
„ „ -	„ E. (Hull to Cromer).	„	S.Ely. moderate gale, 22nd -	B

* The definitions for these letters are A = complete success; B = partial success (*i.e.* justified by strong winds or moderate gales); C = failure.

† The information at present available for checking the warnings to these coasts is at present very incomplete; further information will probably improve the results.

These are the only warnings issued at present; they were issued in *good* time.

(2.) There have been as yet no gales experienced without warnings.

(Signed) Fredc. Gaster

Telegraphic Branch,
23rd March 1887.

Submitted—The following Report :—

Report on the Results of the New Stations from which Telegraphic Reports are received (Minutes, p. 58).

The work of organising the reports from the new Foreign Telegraphic Reporting Stations (see Minutes 1886–7, pp. 26, 41) was not nearly complete till the 1st January 1887. Even now we are not receiving the evening reports from Stockholm—(correspondence is still in progress), and the endeavours to obtain evening reports from Wiesbaden or Belfort have failed.

The checking of the forecasts for the months of *January and February* 1887 is complete, and a comparison between the results for this year and those for 1886, is given below.

8.30 p.m. Forecast.

PERCENTAGE of SUCCESSFUL FORECASTS in—

	JANUARY.		FEBRUARY.	
	1886.	1887.	1886.	1887.
All districts - - - -	80	80	79	85
England S. and E. with Midland Counties only.	84	86	86	89

The above values show a distinct improvement in the forecasts for this year, but as much depends on the type of weather prevalent, it will be well at some further date when the system has been working for a longer time, to make a further report as to the types of weather, the forecasts for which are most affected by the extension of the area of observation.

(Signed) FREDC. GASTER.

Telegraphic Branch,
23rd March 1887.

Mr. Scott was instructed to prepare for the forthcoming Annual Report a list of all the telegrams received within the year from Ben Nevis observatory, with a statement of their value in connection with weather forecasting.

Read—A letter (No. 451), from Dr. Paulsen of Copenhagen requesting that the Office would supply him with information from their logs, at his expense, to aid in the preparation of the Atlantic charts he is preparing in conjunction with Dr. Neumayer (Minutes, 1878, p. 107).

Mr. Scott was authorised to supply the data if the work could be done outside the Office.

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